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EDITORIAL.

Irrigation of Coconuts.

Conditions which should ensure the proper development and growth of the coconut palm have been discussed by several authorities on the cultivation of this crop. In an article which we reproduce this month, by Messrs. H. H. Wardlaw and F. R. Mason, Acting State Agricultural Officer, Perak, an account, which merits a careful study, is given of a method of irrigating coconut areas and controlling drainage in order to facilitate the free movement of sub-soil water, one of the conditions favourable to the growth of coconuts. The method described has yielded satisfactory results when applied to an area of dwarf coconuts growing on a comparatively friable soil. In addition to drainage and irrigation, the effect of the cover crop *Centrosema pubescens* on permeability of the soil is discussed, and certain problems regarding the desirability or otherwise of planting covers, and their effect on well irrigated land are suggested as worthy of investigation.

Coffee.

The first record of coffee growing in Malaya, as far as we have been able to ascertain, was in 1779, when a few plants were noticed in a garden in Malacca. The origin of these plants is, however, a matter for conjecture, but it is not improbable that Java was their country of origin. Probably the earliest instance of the cultivation of coffee on a larger scale was that recorded in Singapore in 1822, when it is said to have shown promise, but apparently this optimism proved to be unwarranted, as far as that locality was concerned.

By the year 1881, coffee of the Liberian variety appears to have been definitely established as a plantation crop, and at that time, was being sold for $22 to $25 per picul, the cost of production being $12 to $15 per picul. The reader is reminded that the value of the dollar at that time was 3s. 6d.

The story of the decline in local coffee growing has often been related and was due to fall in prices, insect attack and the superior attraction of rubber planting. There have been sporadic attempts, more especially during rubber slumps to revive coffee cultivation for the local market on a small estate scale and the crop has been under trial at the Central Experiment Station, Serdang, for some years. In this number we print an article by Mr. J. Lambourne, Assistant Agriculturist, in which he recounts the results of experimental work at Serdang. Owing to adverse

soil conditions in the area chosen, results have been disappointing but we desire to emphasise the importance of this article since it provides a warning to those who contemplate taking up coffee growing on the plains, an undertaking which the author makes clear is very liable to bring great disappointment, for although Malaya possesses soils which are better suited for coffee cultivation than those at Serdang, the article clearly shows that a variety of agricultural operations is essential. Maintenance costs are, in consequence, high, so that unless there is a great and unexpected improvement in prices over a period of years, the cultivation of coffee under estate conditions on the plains is unlikely to be remunerative.

The Thirteenth Malayan Exhibition.

The Thirteenth Malayan Exhibition which was held at Kuala Lumpur on the 1st, 2nd, and 3rd of August was opened by His Excellency Mr. A. S. Small, Officer Administering the Government, Straits Settlements, and High Commissioner for the Malay States. In some respects the Exhibition was smaller than that of last year, but the total number of visitors was considerably greater than in 1935. Although most forms of rural industry were represented, it was unfortunate that, owing to the presence of disease, it was not possible to hold the livestock competition.

It is gratifying to record the success of the rubber and padi competitions organized by the Department of Agriculture, S.S. and F.M.S., and that the exhibits were of a high standard which rendered the task of the judges somewhat difficult. This can be ascribed to the fact that lower grades of these products have been eliminated in the numerous local shows which are held during the year.

We are also able to record an increase in the number of entries in the Agricultural Section. In spite of the space provided, overcrowding was noticeable; this might be avoided if, on future occasions, some preliminary selection were undertaken. Another feature of this section which we think could be improved with advantage is the labelling of exhibits, particularly of the lesser known fruits and jungle products which, we noticed, aroused considerable interest. Had the labels been more informative there is no doubt that exhibits of the kind mentioned would have attracted greater attention than they did.

The increasing interest on the part of the public in the breeding of poultry was greatly stimulated by the exhibits in the Poultry Section, and in particular, by those in the special poultry exhibit staged by the School of Agriculture, Malaya. We have no hesitation in saying that this exhibit was one of the most prominent items of the Exhibition.

Original Articles.

AN ACCOUNT OF IRRIGATION AND DRAINAGE CONTROL ON AN AREA OF DWARF COCONUTS

BY

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The following is an account of a method of irrigating coconut land and controlling drainage, which has been found successful when applied to an area of dwarf coconuts, planted in 1920-21 and which is being put into effect on similar areas of 'dwarfs' recently planted on an estate in Krian, Perak.

It should be mentioned at the outset that the estate in question is exceptionally favourably situated in that a limited quantity of fresh water is available from the Krian Irrigation supply, and that it is realized that only in a limited number of cases will the system described be capable of being followed *in extenso,* but that modifications thereof may be possible.

The method is based on the well known theory that the best results are obtainable from coconuts if the sub-soil water is free to move.

The policy on the estate mentioned above has, for the past twenty years or more, been to put this theory into operation gradually by experiment.

The steps taken, or rather the process of evolution was as follows:—

Firstly. To bund effectively the whole estate and exclude all salt water.

Secondly. The separation of transport and drainage canals.

Thirdly. To maintain the transport canals full of fresh water, and the drainage water in the drainage canals as low as possible by means of water gates connected with the drainage system.

Fourthly. To keep the water in the transport or irrigation canals at a definite level but always moving by means of weirs and water-gates connected with the irrigation system but quite independent of the drainage system, it being essential to obviate "still" or stagnant water conditions.

For many years no change was made in the above arrangement, but it was considered that the irrigation and drainage canals were too far apart for effective irrigation and, although crops showed some improvement and high yields were harvested and maintained year after year, it was decided to experiment with intensive irrigation and the first field to be so treated was one planted with "Dwarfs".

The method and results will be given later in this article.

The following particulars will, it is hoped, enable readers to visualize conditions on the estate.

Situation.

A large block of land in the form of a peninsula bordered by river and sea, all water on sea and river boundaries being salt.

Range of Tides.

The mean range of tides is about 4½ feet which, under the best of conditions, does not permit of more than 3 feet drainage being maintained.

Soil.

The soil is a coastal alluvial clay loam typical of that to be found in Krian and many other coastal areas of Malaya but not as stiff as is to be found in many areas on the Bernam and Perak Rivers.

When first bunded in, but in an undrained condition, the surface soil is grey in colour changing to blue or blue grey a few inches below the surface down to the water table and to an indefinite but considerable depth, and it would appear to the eye to be of a type impermeable to water and therefore not irrigable.

Observations carried out over a period of many years, however, have shown that, given drainage, *i.e.* aeration, a definite change takes place and the soil is proved to be rich in all plant food, and the amount available is limited only by the depth of the effective drainage which again is controlled and limited by the range of tides.

When aerated, this soil loses certain ferrous salts and, assuming it is not subjected to periods of salt water flooding, and drainage is maintained in good order, it should never revert to its former condition of blue clay.

In support of this statement it may be said that canals 5 ft. to 6 ft. deep filled in after the estate bunds were made water-tight, and cut through at right angles and inspected 15 to 20 years later, showed clearly in the blue clay the outline of the original canal, and the filling was still in the condition of top-soil containing humus. In fact, no physical change apart from a darkening in colour appeared to have taken place in the earth filled in.

After drainage and efficient aeration the soil is found to be eminently suitable for the cultivation of coconuts giving high yields.

Water Supply.

Since on the estate in question the river water is salt and unsuitable for irrigation purposes, recourse has had to be made to a controlled amount of fresh water (approximately 1,190 gallons per day) from the Krian Irrigation supply which is connected through a Government syphon box to the estate transport or irrigation canal system.

Details of the Coconut Areas.

The estate is planted with both "tall" and "dwarf" coconuts. The former predominate and some of the fields are known to be at least 35 years old.

The first field containing "dwarfs" was planted in 1920 and these palms have been in bearing since 1925. A statement of yields per acre from this field since that date will be found at the end of this article.

The distance of planting or spacing in the "talls" varies considerably, but in the oldest areas is approximately 28 ft. x 28 ft. square giving 55 palms per acre, and in the later plantings 28 ft. x 28 ft. equilateral triangular system giving about 66 palms per acre. The "dwarfs" planted in 1920 are spaced 22 ft. x 22 ft. square giving 90 palms per acre.

Further large areas have recently been planted with the same varieties, *i.e.* green and yellow "dwarfs", 22 ft. x 22 ft. and also 20 ft. x 20 ft. equilateral triangle. These new areas are mangrove swamp recently reclaimed from the sea by bunding, soil conditions being similar to those throughout the estate.

Drainage and Irrigation.

The interpretation of drainage as applied to a crop such as coconuts does not, in the opinion of the writers, mean the complete exhaustion of water from the soil as is sometimes indicated when discussing drainage in connexion with agriculture in temperate climates.

In the case of coconut cultivation the writers would consider a well drained soil one in which there is a constant soil water movement, but this movement should be very slow, in fact a bare seepage, and by no means of such a nature as to result in washing the soil, as this might prove to be harmful.

This movement or seepage is, however, possible only so long as there is a difference in level between the irrigation and drainage systems, and provided always that the soil is permeable. If no movement takes place then steps should be taken either by additional drains or the planting of suitable covers to rectify matters. A badly drained soil would be one in which soil water movement was non-existent thus giving a "still" or stagnant water table near the surface, conditions under which coconuts will not thrive for long.

The importance of soil water movement for the proper development and growth of the coconut palm, a well known principle enunciated by Copeland (1), Sampson (2), and others, may be illustrated by quoting instances in Malaya where coconuts are found growing in a soil which is to all intents and purposes pure sand, the conditions being as follows:—

In one case on the sandy coastal belt on the island of Penang, in another the sandy coastal belt in Province Wellesley and a third, an almost identical sandy soil of the same origin, in the Dindings, but in the last case forming a ridge some two and a half miles from the coast where accretion in the form of mangrove swamp has taken place between it and the present sea coast.

In the first and second cases the palms grow well and yield heavy crops, whereas in the last case the palms are sickly looking, stunted, and bear little or no crop.

The explanation, as the writers see it, is that in the first case there is high land behind and nothing to impede the flow of soil water from this high land to the sea, passing on its way through the root systems of the coconut palms.

In the second case there is behind the coconuts a considerable area of alluvial clay soil in which wet rice is successfully cultivated and there is a constant movement of soil water from this area through the sandy coastal belt on which the coconuts are planted.

In the Dindings area the sandy belt is slightly higher than the land behind it and there is consequently no soil water movement through it, except that caused by rainfall, and the palms fail to thrive despite repeated manuring and cultivation.

For an irrigation scheme such as is described in this article it is necessary to have an adequate supply of fresh water from an outside source such as a river or stream to maintain the constant movement of water through the soil particularly during the drier seasons.

In the case of the estate described in this article this supply comes from the Krian Rice Irrigation system.

The system of irrigation found most satisfactory provides for a slow but steady movement of soil water through the clay soil described earlier in this article, and is obtained by a series of alternate irrigation and drainage channels or ditches arranged as indicated in Diagram 1.

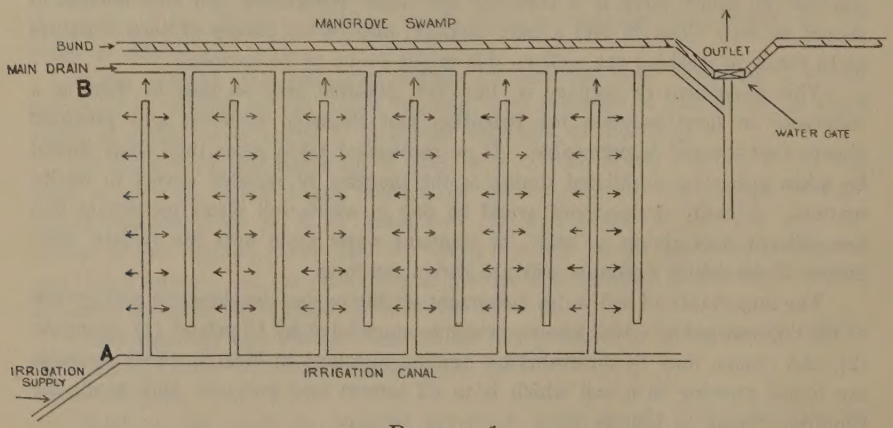

DIAGRAM 1.

Experiments in different soils will indicate the distance these channels should be from one another to give the best results.

The above diagram indicates a simple lay-out and presupposes the necessary fall in levels from the irrigation channel A to the main drain B, when control becomes a fairly simple matter. In cases where there is little or no fall in levels between main irrigation and drainage channels more careful manipulation is necessary.

This is carried out by controlling the level of the water in the main drain so that it is maintained, as far as possible, well below the water in the irrigation channel.

The resulting difference in water level in irrigation and drainage channels causes a steady flow of soil water from the former to the latter as indicated by the small arrows in the above diagram.

Where the supply of irrigation water, *i.e.* fresh water, is unlimited, and the rise and fall of the tide outside the bund and water-gates are sufficiently great, control of water table or level in the drainage system is not difficult, but on the estate described, conditions are difficult and far from ideal due to the following factors:—

1. Irrigation water is limited.
2. The mean range of tides is only about $4\frac{1}{2}$ ft. so that under the most favourable weather conditions little more than 3 ft. drainage is possible and often less.
3. For 6 or 7 days monthly the drainage gates cannot be opened, and, unfortunately, heavy rains often synchronize with these periods.

It has been found that fresh water is essential for irrigation purposes. The estate bunds are maintained in first class order and salt water is in no circumstances allowed to enter the drainage or irrigation systems.

In passing, it should be noted that the internal boundary canal running parallel with the bunds encircling the estate should always be for drainage, and

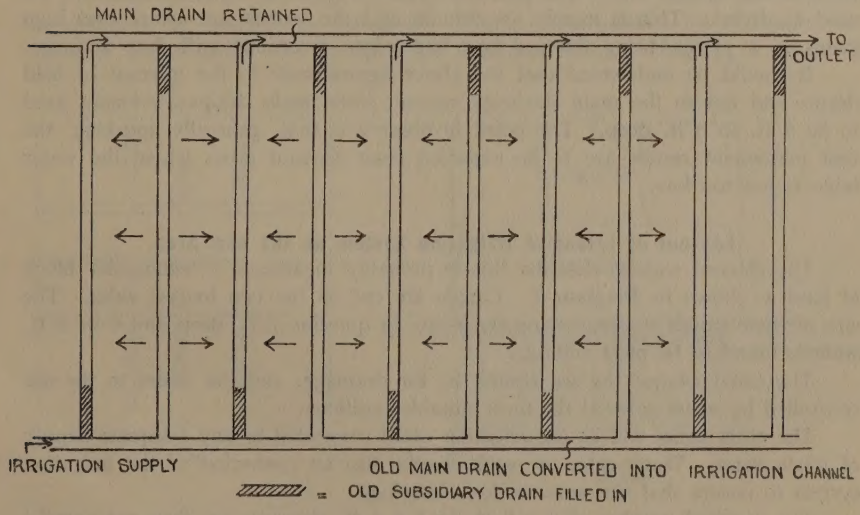
MAIN DRAIN RETAINED
TO OUTLET
IRRIGATION SUPPLY
OLD MAIN DRAIN CONVERTED INTO IRRIGATION CHANNEL
= OLD SUBSIDIARY DRAIN FILLED IN

DIAGRAM 2.

the water level kept as low as possible to prevent water logging and a spongy bund, conditions which will in time lead to seepage of salt water through the bund to the drainage system.

In the case of the older area of palms, which was planted and had matured before the system of irrigation described in this article was introduced, the problem of obtaining the necessary drainage or soil water movement was more difficult of accomplishment. Intensive irrigation has however been obtained in such areas by retaining existing drains between rows of palms and utilizing alternate ones as irrigation channels by filling in their extremities for a distance of from 30 to 90 ft. depending on soil conditions, thus cutting off their communication with main drains and finally connecting them up with the irrigation supply.

The diagram on the previous page will help to illustrate the procedure adopted in the case of old areas in which previously nothing but drains existed.

Depth of Drainage for Coconuts.

The question of the optimum depth of the water table for coconuts has always been a debatable point. In the case of the estate described here the depth is limited to an average of about 3 ft. only, due to the low range of tides, but on many estates where conditions are much more favourable, for instance in the case of many estates situated on the Perak and Bernam Rivers, a depth of 5 ft. or more can be maintained. The writers do not, however, advocate this in the absence of irrigation.

If irrigation is in operation, then 5 ft. is considered the maximum depth for the drainage system and rather less if no such system exists and all channels are used as drains. This is merely an opinion and the writers are aware that high yields are at present being obtained from large areas of coconuts with deep drainage.

It should be understood that the above figures refer to the internal or field drains and not to the main drainage system; these main drains obviously need to be 5 ft. to 6 ft. deep. The point to observe is that, generally speaking, the best permanent results are to be expected from coconut areas where the water table is not too low.

Lay-out of Intensive Irrigation System on the new Area.

The clearest way to describe this is probably to assume a rectangular block of land as shown in Diagram 1. Canals are cut on the two longest sides. The size of these canals varies, but on the estate in question 5 ft. deep and 6 or 8 ft. wide is found to be most suitable.

The canal nearest the sea should be for drainage, and the outlet to the sea controlled by water-gates at the most suitable positions.

The other canal will be an irrigation canal connected to any adequate supply of fresh water. Water-gates or weirs should also be connected to the irrigation system to ensure that the water is kept moving.

The required number of 3 x 3 ft. or 4 x 4 ft. channels are then cut parallel to one another and at a distance from each other which must be found by experi-

ment for various types of soil. Alternate 3 x 3 ft. or 4 x 4 ft. channels are connected with the main drainage canal and the others with the irrigation canal.

On the estate described, the most satisfactory dimensions for irrigation and drainage channels between rows of palms have been found to be 3 ft. x 3 ft.

The earth excavated from these channels is used to form a small bank or bund running parallel with and on each side of each channel but about 3 ft. from the edge so minimizing any tendency towards soil erosion and rapid silting up of the channels or drains.

The diagram below illustrates a section through one of these channels and shows details of the construction.

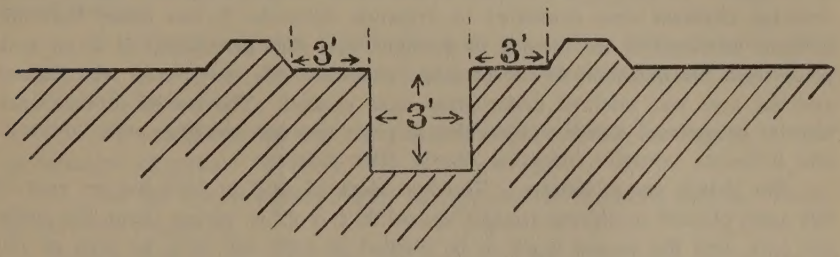

DIAGRAM 3.

It often becomes necessary to carry the irrigation water supply across drains or channels for water-borne transport. This is accomplished by syphoning the drainage water under the transport or irrigation water. Diagram 4 illustrates

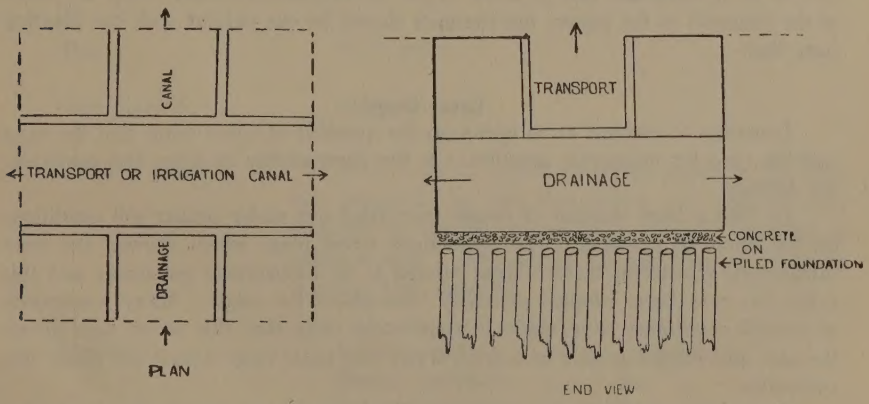

DIAGRAM 4.

the method. A simple description is two boxes built one above the other, the angle of one to the other depending on the position of the drainage and irrigation canals, but usually a right angle.

Spacing of Irrigation Channels and Drains.

This must depend on the nature of the soil and its permeability. In stiff clay soils where permeability is poor, closer drainage would be desirable and cover crops might be expected to ameliorate the conditions.

In the area planted in 1920, where the spacing of the palms was 22 ft. x 22 ft. square, the drainage channels were cut between every 4th row of palms, *i.e.* 88 ft. apart. In 1931 it was decided to introduce intensive irrigation, and alternate drainage channels were converted to irrigation channels; it was found that this distance was suitable for the soil in question, and slow percolation of water took place from the irrigation to the drainage channels. No cover crop was planted and the area was retained under grass close slashed. The results of this work were so exceptional that it was decided to plant two new clearings with "dwarfs" and introduce intensive irrigation shortly after planting.

The details are as follows:—The first block planted in 1935 has an area of 224 acres planted equilateral triangle spaced 22 ft x 22 ft. giving about 103 palms per acre, and the second block to be planted in 1936 will have an area of 100 acres planted equilateral triangle spaced 20 ft x 20 ft. giving about 123 palms per acre.

The distance between drainage and irrigation channels is four rows of palms.

The area will be maintained clean weeded until the palms are 2 to 3 years old and it is then proposed to allow it to revert to grass and keep it close slashed.

A passing note on the equilateral system of planting which may save a lot of trouble is to remember that in order to get the maximum distance from the edges of the channels to the palms, the channels should be cut parallel with the planting base line.

Cover Crops.

Irrigation of coconut areas opens up the question of cover crops and the most suitable type for improving aeration, *i.e.* the permeability of soils, and maintaining fertility.

In 1924 a large number of covers were tried out under similar soil conditions on the estate in question. The leguminous cover plant which showed the most satisfactory growth on mature areas proved to be *Centrosema pubescens* and this cover has now been adopted generally throughout the estate. Many inspections of subsoil conditions have made it abundantly clear that this cover does aerate the soil, and irrigation tests with fresh water that have been carried out prove this contention.

Centrosema pubescens has one great disadvantage and that is that it requires assistance in establishment and it will not kill out grass. Weeding costs are there-

fore increased in coconut areas under this cover but so far as this estate is concerned, it is considered the finest form of cultivation as it opens up the soil in a way that cannot be done by any tool or machine; the increased cost can be considered as cultivation expenditure and is fully justified by results.

On the estate in question, *Centrosema pubescens* has been found to open up the soil to such an extent that the writers consider that experiments to elucidate the following points are worthy of trial:—

1. If the soil can be made permeable by drainage only, is there any advantage in planting covers in areas intensively irrigated or which it is intended to irrigate intensively? This refers not necessarily to questions of irrigation but also to those of soil fertility.

2. If intensive irrigation is introduced to areas which have been for many years under *Centrosema pubescens*, will the water percolate through the soil too rapidly and do harm?

3. Is it possible to increase the yields of 'talls' in the same way as 'dwarfs' by intensive irrigation?

4. Can the size of nuts of 'talls' be increased in the same way as 'dwarfs' by intensive irrigation?

Various methods of cultivation and treatment are being tried out on certain estates in Malaya, where the soil is a very stiff clay, in an endeavour to elucidate some of the points mentioned above.

Yields.

The particulars of the area of "dwarfs" which has given record yields on the estate in question are as follows:—

Area: 41.05 acres.

Date planted: 1920.

Planting distance: 22 ft. x 22 ft. square giving 90 palms to the acre, but owing to the fact that bunds and channels are included in the planted acreage the total number of palms is only 3,488 and the average number of palms per acre just under 85.

Varieties:

Dwarf "red"	—	3 palms.
Dwarf "greens"	—	90 ,,
Dwarf "yellows"	—	3,395 ,,

Year.	No. of nuts harvested.	Av. No. of nuts per palm.	Copra per acre in piculs.	No. of nuts per picul of copra.
1925	194,530	56	7.83	604
1926	235,360	67.5	9.54	600
1927	209,876	60	7.24	707
1928	386,876	111	14.33	646
1929	235,444	67.5	8.96	602
1930	369,056	106	14.88	592
1931	371,645	106.5	14.93	590
1932	345,208	99	15.18	531
1933	514,091	148	25.99	457
1934	470.028	135	23.56	461
1935	531,219	152	27.60	458

NOTE.—1 picul = 133⅓ lbs.

Intensive irrigation was introduced in 1931 and fewer nuts were required per picul of copra in 1932. In 1933 and subsequent years, yields have been phenomenally high and the nuts have been very much larger than formerly.

In view of the results already recorded, the writers feel justified in anticipating potential yields of at least 30 piculs of copra per acre from the new area described above planted with "dwarfs" in 1935, and also the area it is intended to plant this year with the same variety making a total of 324 acres.

Similar methods of intensive irrigation were introduced, at a later date, to several areas of 'tall' coconuts but results to date have not been so encouraging, due, in the writers' opinion to the following factors:—

(*a*) The 'tall' palms have been planted very much longer than the "dwarfs" and insufficient time has elapsed for the palms to respond to a change in soil conditions.

(*b*) The areas under 'talls' have been for some years under a cover of *Centrosema pubescens* which has opened up the soil to such an extent that excessive leaching takes place as soon as irrigation water is supplied.

In one field so treated, the water was seen to be passing through the soil so rapidly that the irrigation supply had to be stopped immediately.

It is in view of the above results that the writers advocate further investigation into the effects of cover crops as compared with, say, slashed grass. The writers can see no reason why, with facilities for irrigation supply available, the methods described in this article should not be equally successful when applied to newly planted areas of 'tall' coconuts.

References.

(1) E. B. Copeland. The Coconut. Macmillan & Co. Ltd., London. 1931.
(2) H. C. Samson. The Coconut Palm. John Bale, Sons & Danielsson, Ltd., London. 1923.

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THE CULTIVATION OF COFFEE AT THE CENTRAL EXPERIMENT STATION, SERDANG

BY

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Introductory.

The cultivation of coffee at the Central Experiment Station, Serdang, was commenced in 1925 when an area of 45 acres of flat land of the type subsequently described as valley quartzite soil was planted. The seeds from which the plants were raised were received from Java and were selected strains of the following species:—*Coffea robusta, C. canephora, C. ugandae, C. quillou, C. excelsa, C. abeokutae,* and *C. liberica.* These different strains were planted with a view to testing their suitability to local conditions and yielding capacity, and also to ascertain the effect of cover crops, green manures and shade.

It was early realized that in consequence of the considerable variation in the soil, the growth of the coffee bushes was uneven. This unevenness increased, and once again confirms the great care necessary when examining land for planting in valleys on quartzite formations (*Malayan Agricultural Journal,* Vol. XVII, p. 179). Furthermore, considerable variation occurred in type of bush and berry within each species and certain of them were found to produce small berries and beans. These two factors have been responsible for the low yields and the disappointing monetary returns obtained. Although there are soils in Malaya which are well suited for coffee cultivation and capable of producing higher yields, it has been decided to publish this article in order that prospective planters may realize not only the difficulties which may be encountered, but also the relatively costly attention which must be given to the crop. In the light of experience gained during the past few years, the production of coffee under estate conditions on the plains must be considered a far from profitable proposition. Unless prices for this product show signs of definite improvement for an extended period, the cultivation of lowland coffee in Malaya is likely to be restricted mainly to small areas of Liberian coffee under Asiatic control in the coastal districts.

Soil.

The land selected is flat, and previous to planting it was under light jungle and included several swamp areas. The jungle was burnt and the land was cleared of all stumps and ploughed and harrowed by tractor power. The soil, as previously stated, is of the valley quartzite type and varies very considerably in different parts from a heavy dark clay through clay loams to dark sandy loams. The land was thoroughly drained before planting.

Planting.

The seeds were sown in September 1934, in nursery beds, and the seedlings were planted in the field about a year later, *i.e.* between October 1925 and January 1926. All varieties of seedlings were planted 10 ft. by 10 ft. square.

Good growth was made over a large part of the area but there were patches of soil on which growth was poor. Supplying and manuring in these areas were carried out, but the plants have never been vigorous. These patches are, in general, associated with the occurrence of acid shales close to the surface.

During 1930, the five acres of *Coffea quillou* were removed owing to the fact that this variety was more badly infested with the coffee berry borer (*Cryphalus hampei*) than the other varieties, and appeared to be a source of infestation to the other areas. *Coffea quillou* was replaced in 1931 by *C. Dybowskii*, a Java hybrid of Liberian type somewhat similar to *C. excelsa*.

Cover Crops and Green Manures.

In April 1926, the whole area was divided into nine strips running east and west, and so arranged that there should be approximately half an acre of each variety of coffee in each strip under cover crop or green manure, and one acre under shade trees. The strip of shade trees was planted along the middle of the area with a strip of each cover crop or green manure on either side. The cover crop used was *Calopogonium mucunoides* and the green manures were *Tephrosia candida* and *Crotalaria anagyroides*. The shade trees first planted were a broad-leaved species of *Albizzia* interplanted with *Gliricidia maculata* and later one or two trees of *Albizzia moluccana* were planted at the western end of the area.

After *Calopogonium mucunoides* had been established for some time, it was found to be retarding the growth of the coffee plants and causing the leaves to turn yellow, in spite of the fact that a circle with a radius of 3 feet round each bush was kept clear of the cover crop. As the *Calopogonium* continued to harm the young bushes it was turned into the soil, and the area has since been kept clean-weeded. The *Tephrosia candida* and *Crotalaria anagyroides* were pruned every three months and the prunings were worked into the soil on the plots in which they were growing. The green manures were removed in March, 1928. The *Crotalaria* plots were afterwards kept clean-weeded, but the *Tephrosia* plots were sown with *Leucaena glauca* (Lamtoro). The latter never made very vigorous growth, but a number of the plants still remain and form a light ground shade. *Albizzia* sp. made poor growth as did most of the *Gliricidia maculata* trees, consequently shade was negligible for some years, and even now is not satisfactory.

Manuring.

It was intended to conduct a series of manurial experiments over the area, but this was dropped owing to irregularity in soil conditions. Fertilizers were applied from time to time when the appearance of the bushes suggested the advis-

ability of manuring. Lime also was applied, and an attempt made to ascertain its effect by comparison of crop yields with those from unlimed areas. In September 1930, slaked lime at the rate of 10 piculs per acre (1 picul = 133 1/3 lbs.) was applied to the northern half of the area, followed in October 1930, by a dressing over the whole area of sulphate of ammonia at the rate of 50 lbs. per acre. During February 1931, a complete mixture of chemical fertilizers was given, consisting of sulphate of ammonia 50 lbs., superphosphate of lime 300 lbs., and sulphate of potash 150 lbs., per acre.

No manures were applied in 1932, but during the period June to September 1933 a dressing consisting of rock phosphate at the rate of 3 cwts. per acre and sulphate of potash $\frac{1}{4}$ cwt. per acre was applied, all weeds and dead leaves from beneath the bushes being buried in trenches between the rows at the time of application. The same manures in the same quantities were applied again in December, 1934. These were spread around the bushes and worked into the surface soil during the weeding round.

The mean annual yield of fresh cherries harvested from the limed and unlimed areas shows that, on the whole, the limed area yielded heavier crops than the unlimed area. This was more marked with certain species than with others, but owing to soil irregularities the results are inconclusive.

Pruning.

Pruning was carried out according to the "single stem method". The bushes were topped at $5\frac{1}{2}$ feet and all suckers were removed from the main stems as they appeared. The primary branches were allowed to grow, and secondary branches were thinned so as to allow light to all parts of the bush, whilst still retaining the maximum of fruiting branches.

Thinning of secondary branches applies more particularly to the Liberian types, for the robusta types do not develop so many secondary branches. It has been found that several of the primary branches in the robusta types break close to the main stem especially when bearing large crops of fruit, and it has been necessary to remove them and provide, where possible, for new growth to take their place.

Effect of Green Manures and Shade.

As already stated, *Calopogonium mucunoides* had the effect of retarding growth and causing the coffee plants to assume a yellow and unhealthy appearance. The tall legumes (*Tephrosia candida* and *Crotalaria anagyroides*) caused the coffee plants to be drawn up too quickly unless the former were kept pruned. As regards yields of fruit, the cover crop, green manures and shade all appear to have had an adverse effect, for, on the average, the clean-weeded plots have produced the highest yields. The form of lay-out of the experiment does not lend

itself to statistical analysis, and it is therefore impossible to say whether the differences are significant. Further, as the soil varies considerably within blocks, and the growth of the bushes has been correspondingly uneven, it would not be wise to draw any definite conclusions from the records of yields.

The shade tree area has yielded on the whole less than the other areas, but this may be due to competition and inadequate shade, for, except in patches, the trees have not given satisfactory shade to the bushes. Where there is shade from one or two *Albizzia moluccana* trees the bushes are a more healthy green but appear to bear less fruit than those in the full sun. Nothing definite can be said regarding the merits of shade until further experiments have been carried out. In this respect, not only the effect of shade on the bushes but density of shade and the most suitable tree for the purpose require to be investigated. *Gliricidia maculata* has been planted in part of the Dybowskii coffee area and is giving a light shade which appears ideal, but the yield of fruit for the first year is smaller from the shaded than from unshaded areas. Since there is only one plot under shade, and it is the first year the bushes have borne fruit, nothing definite can be said regarding the merits of this type of tree as shade for coffee.

Planting Distances.

The planting distance of 10 ft. by 10 ft. which was adopted for all varieties, is too wide for the robusta types and the Liberian type has become over-crowded. *Coffea liberica, C. abeokutae* and *C. Dybowskii* require planting at 12 ft. by 12 ft., and *C. excelsa,* which has a wide-spreading habit, could very well be planted at 14 ft. by 14 ft. The distance of planting is important since, when too closely spaced, branches of adjacent bushes interwine and impede those engaged in inspecting or in harvesting the fruit. On the other hand if spacing is too wide, considerable areas of soil are unshaded, and the growth of weeds is encouraged. As the coffee bush has very shallow roots it is essential that the soil should be shaded to keep it cool thus preventing rapid evaporation and conserving fertility. Moreover, frequent weeding with the changkol is liable to damage the feeding roots. According to the experience gained at Serdang, low cover crops among coffee are undesirable.

Diseases and Pests.

The coffee bushes, more especially the robusta types, have been subject to a die-back of the branches, often after they have borne a heavy crop of fruit. The primary branches have also broken close to the main stem. The die-back is accompanied by yellowing or chlorosis of the leaves.

As is usual on the plains the coffee leaf disease (*Hemileia vastatrix*) is nearly always present, but it appears to do very little damage to the bushes at Serdang.

A few bushes of *Coffea abeokutae* were attacked by "Thread Blight", a fungus, the white mycelium of which spreads over the leaves and branches. This

occurred in a small patch of bushes and was treated, on the advice of the Mycologist, with a proprietary sulphur spray which cleared it up in a comparatively short time. The disease did not spread and there has been no recurrence.

The coffee berry borer (*Cryphalus hampei*) has been prevalent, more especially in the robusta types. All the Quillou coffee was cut out in 1930 because it was so badly infested by this borer. These small beetles cause damage by boring into the beans causing considerable loss of crop by their depredations. In Malaya, where there are always fruits upon the bushes, the berry borer is not easily controlled once it has become established. The incidence of attack can be diminished by harvesting frequently all ripe and black berries. During the past year this pest has done comparatively little damage to the Liberian types and in the robusta types the incidence of attack has diminished considerably.

Harvesting.

Although a few fruits ripened during the latter part of 1927, regular harvesting and recording of yields were not commenced until March, 1928. There are no distinct fruiting and resting seasons with coffee at Serdang although the largest proportion of the crop is harvested in April and May, and November to January.

The varieties *Coffea canephora, C. robusta,* and *C. quillou* produced ripe fruits in two years and nine months from seed, and at one and a half years after planting in the field. *C. ugandae* was approximately three years old, *C. abeokutae* and *C. excelsa* three years and two months and *C. liberica* plants three years and nine months old from seed when the first fruits were ripe. Records show that flowers appear at frequent intervals throughout the year and that all the varieties flower on or about the same day. Consequently the bushes contain ripe fruit almost continually and a fortnightly harvesting round is essential, otherwise there is considerable loss of crop.

Yields.

The yields of coffee from these areas have been disappointingly low owing to several causes. The soil is of low fertility and varies considerably over the area, consequently the growth and productivity of the bushes have been affected.

The robusta types of coffee are more susceptible to die-back and attacks from the coffee berry borer than the Liberian types, consequently these types have not yielded so well as *Coffea excelsa* and *Coffea abeokutae,* which are comparatively free from die-back and are not so heavily infested with the berry borer.

Yields of coffee berries per acre from the different varieties and plots in the area are recorded in the following table.

Table I.

Average Yields of Coffee Berries per acre per annum. Period 1928—1935.

Variety	*Calopogonium mucunoides*	*Tephrosia candida*	*Crotalaria anagyroides*	Clean Weeded.	Shade Tree	Mean Yields
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
			Robusta Types			
Canephora 1-03 ...	985	988	978	—	—	983
„ No. 1 ...	1,080	1,093	907	1,158	1,007	1,049
„ No. W1 ...	514	621	744	1,267	774	784
Robusta 59-01 ...	1,062	1,002	1,006	—	—	1,023
„ 78 ...	594	821	709	1,029	766	784
*Quillou 66-04 ...	676	1,059	954	1,390	657	947
Ugandae 1-02 ...	619	912	864	1,141	1,517	1,011
„ 2 ...	1,068	1,034	761	1,006	1,118	997
			Liberian Types.			
Abeokutae No. ZZ ...	2,119	2,510	2,565	3,480	2,070	2,544
Excelsa 121-10 ...	2,665	2,811	2,657	3,431	1,634	2,640
„ ...	2,669	3,018	3,322	3,909	3,313	3,252
Liberica No. 1 ...	1,004	1,149	911	1,148	979	1,038
Dybowskii (1935 only)	1,485	1,813	1,732	1,760	1,290	1,616

* 1928-1930 only.

The proportion of fresh berries to prepared dry beans was recently determined from a number of samples (Table II). The results agree closely with those published in the *Malayan Agricultural Journal*, Vol. XVIII, p. 481.

The crop increased each year from 1928 to 1930, but in 1931 yields decreased considerably. There was a gradual increase during the next two years (1932 and 1933) with a decline again in 1934 and a partial recovery in 1935. The application of a complete mixture of fertilizers in February 1931 does not appear to have had much effect on yields during that year but may have helped to increase the crop in 1932 and 1933. During the latter half of 1933 rock phosphate

Table II.

Proportion of Fresh Berries to Dry Beans by weight

Liberica	...	10	of berries	to 1	of beans.
Abeokutae	...	10	„	„	
Dybowskii	...	7.5	„	„	
Excelsa	...	7.5	„	„	
Robusta	...	5	„	„	
Canephora	...	5	„	„	
Quillou	...	4.5	„	„	
Ugandae	...	4.5	„	„	

and sulphate of potash were applied and the leaves and weeds buried in trenches between the rows of bushes; whether this was responsible for decreased yields the following year or whether the latter are due to a cycle in the life of the bush or to weather conditions, it is difficult to say. There has been a peak of production followed by a sudden drop every third year. It is possible that the lime was responsible for depressing yields in 1931 and that the burying of leaves and weeds in 1933 affected the 1934 yields.

In the following table the actual costs incurred are recorded together with the revenue obtained from the coffee harvested, based on the yields secured for the two types of beans. The costs at Serdang are somewhat higher than they would be under estate conditions on account of experimental work, the cost of which cannot be separated from essential charges. Owing to the numerous small plots and different treatments, costs of harvesting always amounted to a high figure. Expenditure has been greater than receipts. *Coffea excelsa* is the only variety that has approximately paid for the upkeep of the area on which it is planted but there is no margin for interest on capital.

The initial costs per acre are as follows:—

Felling	$ 8.00
Burning	2.00
Clean clearing	45.00
Draining	15.00
Ploughing and harrowing	15.00
Lining	1.00
Holing	24.00
Planting	6.00
Supplying	7.00
Sowing cover crops	1.50
Pruning green manures (initial cost)	2.00
Planting shade	2.00
Total ...	$128.50

The following table shows the annual expenditure in upkeep, harvesting and preparation of coffee for market.

Table III.

Annual Expenditure per acre for Upkeep, Harvesting and Preparation for Market.

Operation.	1925 to 1928	1929	1930	1931	1932	1933	1934	1935
	$	$	$	$	$	$	$	$
Weeding	127.51	26.26	21.44	28.25	19.32	24.20	30.30	22.88
Upkeep of drains	7.31	3.88	2.16	2.61	1.53	1.23	1.64	1.08
Pruning	12.53	6.49	8.01	10.09	7.78	7.16	7.48	4.80
Application of manures		.72	.36	3.14	.34	5.03	3.08	
Manures			8.42	17.82	18.00	8.25	8.25	
Pests and diseases	2.36	7.17	.31	.55	3.65	2.21	2.05	4.07
Replanting					14.52			
Harvesting	5.88	22.63	32.26	22.88	17.62	11.58	22.45	20.04
Manufacture		4.81	4.81	4.81	4.81	4.81	4.81	5.07
Total $	155.59	71.96	77.77	90.15	87.57	64.47	80.06	52.94

Table IV.

Average Revenue per acre.*

Variety	1925 to 1928	1929	1930	1931	1932	1933	1934	1935
	$	$	$	$	$	$	$	$
Robusta types	19.22	48.07	28.44	13.14	32.42	34.04	27.07	43.93
Liberian „	11.07	42.32	42.05	19.17	64.00	87.06	62.00	59.44

* Calculated.

Summary and Conclusions.

1. Various strains of coffee were planted with a view to comparing their merits and to ascertain their suitability for cultivation at the Central Experiment Station, Serdang. It was early apparent that the soil in this particular area was infertile and varied considerably throughout the block and this was reflected in the growth of the bushes and subsequent yields of coffee.

2. *Calopogonium mucunoides* as a cover crop among young coffee has a retarding effect on growth and causes the leaves of the plants to turn yellow.

3. The cover crops, tall leguminous plants and shade trees all appear to have had an adverse effect upon the yields of coffee, but it would be unwise to state definitely whether this is the case owing to the conditions under which the experiment was carried out.

4. Lime appears to have had little effect on yields but the fertilizers may have been responsible for maintaining yields, although at a low level.

5. Planting distances and methods of pruning are factors affecting yield, since the largest number of fruiting branches possible per acre without over-crowding is necessary if the maximum crop is to be obtained. Coffee has a shallow root system and, when spacing is too wide, weeding costs are high and there is disturbance of the roots at each weeding; also more of the soil is exposed to the sun which results in loss of fertility.

6. Variation occurs with each strain of coffee in respect of habit of growth, size and colour of berry, size of bean and yield. This is of course common in any population of seedlings unless special care is taken to obtain seeds from bushes of fixed type growing in an isolated position. Variation can be partly overcome by vegetative propagation from selected bushes but does not entirely solve the problem.

7. The dying back of branches and damage done by the coffee berry borer (*Cryphalus hampei*) caused considerable loss of crop especially from the small-berried type *i.e. Coffea robusta, C. canephora, C. ugandae* and *C. quillou*. The

coffee berry borer can be partly controlled by harvesting fortnightly all ripe and black berries. The incidence of this pest has greatly diminished during the past year.

8. Yields have been low owing to the causes mentioned above and in consequence none of the varieties, with the possible exception of *C. excelsa,* has produced sufficiently large crops to pay for the upkeep of the area. It should be recorded that prices have been very low during the greater part of the time these areas have been in bearing.

9. The conclusions enumerated above show the importance of selecting suitable land for coffee cultivation, and instance the necessity, previously pointed out, of avoiding the infertile soil frequently occurring in valleys on quartzite formations.

10. Although the costs recorded cannot be taken as exact criteria for the reasons given, it is considered that prices ralized for lowland coffee during the past few years have been so meagre as to render its production unprofitable under estate conditions.

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THIRTEENTH MALAYAN EXHIBITION

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The Thirteenth Malayan Exhibition, organized by the Malayan Agri-Horticultural Association, was held in Kuala Lumpur during the August Bank Holidays, the 1st, 2nd and 3rd August, 1936. Exceptionally fine weather again prevailed throughout the Exhibition, and the total number of visitors, 46,914 (including ticket-holders) far exceeded the 1935 total of 30,036. In 1934 the total was 22,588, and in 1933 20,093.

Although the Exhibition was actually smaller from the point of view of stall-holders and certain of the competitive sections, the accommodation provided was not reduced, so that the larger crowds of sightseers were able to circulate with moderate ease.

The Association was fortunate in obtaining two additional permanent buildings which enabled a change to be made in the lay-out adopted in previous years. In addition a permanent porch was erected of timber and shingles supplied by the Forestry Department, and a large space in the main building was reserved as a resting place, surrounding a fountain playing in an attractive lily pond.

The Opening Ceremony.

His Excellency Mr. A. S. Small, Officer Administering the Government, Straits Settlements, and High Commissioner for the Malay States, declared the Exhibition open at 11 a.m. on the 1st August, in the presence of a distinguished gathering which included H.H. The Sultan of Pahang and suite, H.H. The Raja Muda of Selangor, the Hon'ble the Undang of Rembau, and the Hon'ble the British Residents of Selangor, Pahang, and Negri Sembilan.

Mr. F. W. Douglas, President of the Malayan Agri-Horticultural Association, in calling upon His Excellency to open the Exhibition, commented on the fact that the area now occupied by buildings was twice that of the 1930 Exhibition. He also drew attention to the large increase in the number of District Shows. After referring to the reduced Trade Section which he considered due to a wave of pessimism which had crept over trade in Malaya, Mr. Douglas went on to appeal to Government to assist the small-holder to obtain the benefit of cheap money by taking over control of pawnshops and by some form of land bank.

In conclusion, Mr. Douglas said:

> "I would like to place on record today the very great sense of loss which this Association felt owing to the departure of Dr. Tempany. His drive and co-operation were always an inspiration to us.
>
> It remains for me to express our thanks to the small army of voluntary workers who come to our aid every year. The success of our Exhibition depends on the work of so many people whom we are too apt to overlook because we so often only see the exhibit and forget the amount of trouble others have been put to. To all of these I can merely say—'Thank you'."

His Excellency, Mr. A. S. Small, reviewed the more salient features of agricultural conditions in Malaya during the past year. He said, *inter alia,*

"Thanks to the rubber regulation scheme, the rubber industry has shown a welcome recovery from the dark days of the slump. The scheme has worked smoothly and well, and during the last twelve months it has brought about a steady reduction of surplus stocks which has naturally resulted in a gradual rise in price to a figure which enables most properties to show a moderate profit.

Confidence in the future of the industry is being gradually restored, and this is indicated by the extent to which the owners of rubber properties are taking advantage of the provisions of the Rubber Regulation Enactment to replace the permissible percentage of old and less profitable rubber trees with new budded plants from high-yielding clones.

The Rubber Research Institute has continued to render valuable service to the industry. In addition to meeting numerous calls for advice in connexion with replanting programmes on estates, it has not neglected the needs of the small-holders. Since May, 1934, it has been building up a service of Asiatic instructors, to which four more officers have been appointed this year, bringing the total to 17. The value of the work of these instructors is well illustrated by the marked increase in the number and improvement in the quality of the exhibits of small-holders' smoked sheet which were to be seen this year at the local competitions and District Shows, constituting the first stage of the All-Malayan Rubber Competition. The winning exhibits in the first stage have been assembled at this Exhibition for the final stage, and you will be able to judge of their quality for yourselves by visiting the Rubber Research Institute's building. The small-holders' rubber smoking cabinets, which have been designed in various very cheap materials by the Rubber Research Institute and have been widely demonstrated throughout the country, have played a considerable part in rendering possible the progress made during the past year.

Coconut and Oil Palm.

"The position in the coconut and oil palm industries has fluctuated somewhat, but at present shows some improvement on that of a year ago. With increasing production of copra and other sources of vegetable oils, the general tendency is for supplies to exceed demand and for competition to remain severe. Other more temporary factors have, however, influenced prices. Thus the processing tax in the United States has encouraged the production of certain oils, formerly of little importance, such as sunflower seed oil, because they have been able to enter that country free of duty. Another effect of this tax has been to divert the Philippine copra supplies to the European markets, and the effect of this competition has been to depress the price of Netherlands Indies and Straits copra in Europe. On the other hand, there has been a considerable demand for glycerine, much of which is made from coconut oil, and this tended to strengthen prices. The shortage of supplies of animal fats and the increased demand for oil cakes caused by the drought in the United States last year also tended to improve the price of copra, and this year's drought already seems to be having a like effect. Finally, an agreement which seems likely to be reached between Norway and the United Kingdom, limiting the production of whale oil during the present season, would also be a favourable factor.

Welcome progress has been made towards improving the marketing side of the industry. At last year's Exhibition it was announced that a Vegetable Oils Section of the United Planting Association of Malaya was in process of formation. The Department of Agriculture has submitted to it a scheme for the voluntary production and marketing under a Malayan Mark of a special grade of Straits copra. The scheme is based on the National Mark Scheme in the United Kingdom, the mark being the producers' guarantee that the product conforms to certain defined standards of quality. It is proposed that this scheme should be instituted on an experimental basis in the first instance in order to ascertain if there is a demand for the improved product at a profitable increase in price.

Copra Drying Cabinets.

"The Officer-in-Charge of Copra Investigations in the Department of Agriculture has also designed a series of copra drying cabinets, capable of producing copra of the best quality in less than 24 hours, for use on holdings of different acreages. They are all constructed of cheap and readily obtainable materials. Two will be on view outside the Department's building in this Exhibition. These cabinets have already attracted much attention wherever they have been demonstrated and have begun to produce their effect on the quality of the small-holders' copra. The improvement in the quality of this product that has taken place in the last three years has been very evident at District and State Shows. Recent reports from the Agricultural Officers in different parts of the country indicate that this improvement in quality is becoming widely recognised by exporters and is resulting in a definite improvement in the price obtained by small-holders.

Another advance that has been the outcome of recent propaganda is the installation in at least two coconut oil factories of refining machinery by means of which a very high-grade coconut oil is being produced.

Pineapple Industry.

"In the pineapple canning industry there has also been marked progress. Canning factories have been much improved and now conform to accepted standards of hygiene and sanitation. A canning officer joined the staff of the Department of Agriculture at the beginning of the year and has now received all the plant needed to enable him to commence his investigation work. Since his arrival he has established close contact with all the canners and been able to render them useful advice and assistance. Under his advice the canners have agreed to the gradual introduction of five standard sizes of cans in place of the numerous different sizes now in use. The Department of Agriculture has drafted and submitted to Government a scheme for the introduction, with the approval of the industry, of a Malayan Mark voluntary grading scheme for canned pineapples, which, like the copra scheme, is based on the National Mark Scheme in the United Kingdom.

The Rice Crop.

"The final estimate of last season's rice crop is not yet available, but the figures already received indicate that it will be as good as, and probably better than, that of the previous season, though not up to the bumper crop of the season 1933-34. The Kedah crop was the largest ever recorded in that State, but unfavourable weather conditions reduced the yield in other parts of the country, notably in Province Wellesley and Krian.

Much has been done in the improvement of rice cultivation and in the settlement of new areas, such as those of Sungei Manik in Perak and Panchang Bedena in Selangor. The All-Malayan Padi Competition, now in its third year, has again been well supported and its effect on the quality of the exhibits will be evident at this Exhibition. Efforts to improve the yield and strain of the rice grown in Malaya have been continued and the three special officers appointed to the Department of Agriculture for rice research have now been at work for a year.

Tuba Root (Derris).

"There has in recent years been a growing world demand for insecticides of vegetable origin which are comparatively harmless to man and the higher animals, to replace the more dangerous arsenical preparations. For this reason interest in tuba root has been well maintained on the world's markets. Tuba root has certain important rivals, notably the Cubé root of South America. Both plants show very marked variation in their toxic content according not only to the variety, but even the strain of each plant. The Department of Agriculture has been vigorously conducting investigations with tuba root and is now attempting to produce clones of high toxic content exactly similar to the now well known clones of high-yielding rubber trees."

The Hon'ble Mr. F. W. South, Acting Adviser on Agriculture, and a Vice-President of the Association, thanked His Excellency for opening the Exhibition, and took the opportunity of paying a tribute to the work of Lieut.-Colonel B. J. Eaton, O.B.E., the retiring Director of the Rubber Research Institute of Malaya.

The Exhibition was divided into three main groups: competitive sections, Government departmental exhibits, and the trade section.

Competitive Sections.

All-Malayan Padi Competition.

The All-Malayan Padi Competition inaugurated in 1934 is now well-established and has become largely a matter of routine. As explained in previous issues of this Journal,* the best samples from local Shows throughout the country are submitted for the Central Competition at the Malayan Exhibition at Kuala Lumpur in the ratio of three entries for every 10,000 acres of wet padi in each District or State.

State Shows, District Shows and local Padi and Rubber Competitions were held at forty-two centres during the several months preceding the Exhibition. The table below shows the distribution of these local Shows in the various States.

	State Shows	District Shows	Padi and Rubber Competitions
Kedah	1		
Penang / Province Wellesley ...	1		4
Perak	1†	3	15
Selangor		5	5
Negri Sembilan		3	1
Malacca		2	1
Johore	1	3	1
Pahang			5
Kelantan	1		
Total	5	16	32

In the Central Competition, every State in the Peninsula, with the exception of Perlis and Trengganu, was represented. The total number of entries received was 139 distributed as follows:—Kedah 22 (17), Penang 3, Province Wellesley 9 (9), Perak 42 (39), Selangor 16 (15), Negri Sembilan 14 (12), Malacca 11 (12), Johore 3 (3), Pahang 17 (19), Kelantan 2 (—). The figures in brackets are for 1935, (total 126).

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* *Malayan Agricultural Journal*, Vol. XXI No. 12, December, 1933, Vol. XXII No. 6, June 1934, Vol. XXIII No. 9, September 1935.

† Perak State Padi and Rubber Competition.

As may be seen from the table, there was a small increase in the number of exhibits submitted for the final competition, although the number of original entries from which the final selections were made was, as in 1935, probably about 5,000.

The high standard of previous years was well maintained and there was a large number of entries with which little fault could be found. Preliminary selection reduced to fourteen the number of exhibits in the running for the six prizes, and these were judged on a basis of marking similar to that used in 1935 except that marks for "type of grain" were not allotted except in differentiating between two otherwise equal entries. Thus, with a possible maximum of eighty, marks were allotted as follows:—

1.	Purity of sample	30
2.	Condition and uniformity of ripeness	20
3.	Condition and uniformity of grain	10
4.	Weight per unit volume	10
5.	Cleanness of sample	10
		80

Two exhibits tied on marks for first place with 78, but the first prize was finally awarded to an exhibit of Radin 13 from Raub (Pahang) as being a variety superior to the Nachin 756 from Sabak Bernam (Selangor) with which it was equal on other characters. The third prize went to Perak for a pure strain Radin and the fourth to Malacca for a good exhibit of Siam 29. Fifth and sixth prizes both went to Negri Sembilan. A special prize was awarded to the 22 exhibits from Kedah as a group. Although winning no individual prizes, this State put up a very good selection of varieties suitable for milling, and as such varieties are of great importance to Kedah it was considered that the entry deserved recognition.

All-Malayan Small-Holders' Rubber Competition.

This competition was inaugurated at last year's Exhibition, and is based on the Padi Competition, selected prize winning exhibits from District Shows being finally judged at the Central Competition at the Exhibition.

This year, entries were restricted to exhibits of smoked sheet only; with cheap and efficient smoke houses now available it was felt that there was no longer any point in admitting air-dried sheet to the competition. The object of much recent propaganda has been to encouraging small-holders to smoke their sheet, and thus obtain a higher price, and this object would be countered if prizes continued to be given for air-dried rubber.

Each entry consisted of three sheets, and a total of 97 entries was received, as follows: Perak 22 (nil), Selangor 17 (20), Negri Sembilan 11 (12), Pahang 13 (3), Malacca 6 (1), Province Wellesley and Penang 8 (6), Johore 20 (12). The figures in brackets are the 1935 entries. Perlis sent three exhibits in 1935, but did not compete this year.

Judging was carried out on the same basis as last year, but, owing to the extremely high standard of quality reached by the exhibits, 100 points were the accepted maximum instead of 10 points, thus rendering possible finer discrimination in judging.

The scale of points was as follows:—

Freedom from over-smoking	10
Evenness of colour	10
Thickness	10
Freedom from:	
Mould and oxidation marks	20
Rust, bubbles and shortness	20
Specks and sand	30
	100

The exceptionally high standard reached by all exhibits rendered judging extremely difficult, and only by penalizing heavily quite minor flaws was it possible to grade the first six exhibits which were selected as follows: 1st Pahang 96, 2nd Negri Sembilan 95, 3rd Selangor 89, 4th Pahang 88, 5th Pahang 82, 6th Johore 80.

The judges commented on the fact that many of the exhibits which failed to win prizes were of first class quality, and there is no doubt that the competition has proved an unqualified success.

Agricultural Section.

The Agricultural Section was again housed in a large temporary building on the left of the main entrance.

The total number of entries received was 5,118, which represents an increase when compared with 5,155 in 1935, as the oils and fats classes were treated as a separate section this year.

The outstanding exhibit was again the collection of fruits and vegetables entered by the Cameron Highlands Society. So good was this exhibit that it was decided to award a gold medal as a special prize.

The large number of entries inevitably tended to overcrowding in spite of the generous size of the building allotted to the section, and the excellent results obtained as a result of the procedure adopted in the padi and rubber competitions would appear to indicate that some form of preliminary selection is advisable in the agricultural classes.

Oils and Fats Section.

This section, which was displayed at the end of the main building, replaced the Special Coconut Section which was a feature of the 1935 Exhibition.

Coconut oil and copra formed the principal exhibits, and although entries were not as numerous as last year, the quality of the exhibits shewed clearly the results of the work of the Department of Agriculture in encouraging the small-holder to produce good copra.

Entries of estate copra were as large as previously and maintained a high standard.

A feature of the section was the large number of locally-made soaps, most of which were attractively packed and of exceptionally good quality.

Other Competitive Sections.

The usual other competitive sections were organized on lines similar to those of previous years. One of the new permanent buildings was allotted to the Horticultural Section. The display of plants and flowers was one of the best staged in recent years, and great credit is due to the section secretary.

The other new permanent building housed the Preserves and Confectionery, Art and Photography, and Needlework Sections, and a school exhibit of handwork. In the first mentioned section there was a notable improvement in the quality of preserved fruits in syrup; a high standard was reached by several of the exhibits in the art section.

The Village Industries and Schools building provided, as usual, one of the most interesting sections of the Exhibition. Selangor and Kelantan both had State stalls, and exhibits from Trengganu were included in the latter stall.

Unfortunately the incidence of disease in Kuala Lumpur District made it impossible to hold the cattle and pig competitions, but the poultry section was organized as usual, although the number of exhibits appeared considerably lower than in recent years. The Cat Section, was held on the last day of the Exhibition, and here again, entries were rather fewer in number than formerly.

Department of Agriculture, S.S. and F.M.S.

A comprehensive exhibit was staged by the Department of Agriculture, covering copra, pineapples, rice, and Derris (tuba root).

High-grade copra was shewn, produced on the new types of high-speed kilns which have been erected and operated at the Coconut Experiment Station, Port Swettenham. There was also a collection of products manufactured from the coconut illustrating the many wide commercial uses to which this crop may be put. A display of coir articles was especially interesting since, in this country, little is produced and that little is of extremely poor quality. Two kilns of the new type were erected in the grounds.

The pineapple exhibit demonstrated the work which is now being undertaken to improve the quality of Malayan canned pineapples and to secure and extend the market for them.

Numerous examples demonstrated the work on selection which is in progress at the Pineapple Experiment Station, Singapore, to produce an improved type of pineapple for canning. There were, also, examples of graded canned pineapples demonstrating the proposed Malayan Mark Grading and Marketing Scheme, and many illustrations shewing the work which is being undertaken at the newly established pineapple canning research station.

Padi and rice exhibits were staged primarily with a view to instructing the padi-growing small-holder. They were in three sections shewing (1) milling of rice, (2) samples of pure strain varieties selected by the Department of Agriculture, and (3) typical faults in samples sent to local competitive shows.

The exhibit of Derris was designed to illustrate the production and uses of this root. The dry root was displayed, together with some of its products, including rotenone, the white crystalline toxic ingredient; other less-known derivatives and extracts were also shewn. The insect pests of tuba root exhibited shewed clearly that Derris poisons are not fatal to all insects.

An interesting exhibit from the Central Experiment Station, Serdang, illustrated the propagation of fruit trees by three different methods, *i.e.* marcottage, etiolation, and bud-grafting.

Departmental publications in English were on sale, and publications in Malay, Chinese and Tamil were distributed.

School of Agriculture, Malaya.

The exhibits of the School of Agriculture were in three groups: (1) photographs and propaganda film, (2) a selection of some twenty different varieties of vegetables grown by students at the School and (3) poultry.

The poultry exhibit was one of the most outstanding features of the Exhibition, and attracted considerable interest, two European officers and three senior students being on duty the whole time and fully occupied in answering queries.

The exhibit was housed separately and attractively, covering an area of 1,000 square feet, and comprised two pens of pullets and an *attap* shed containing miscellaneous exhibits. One pen contained locally bred Rhode Island Reds, and the other, locally bred Light Sussex, each group being accommodated in a type of portable house evolved at the School, which can also be utilized as a day shelter.

The birds shewn were of the home standard of weight, and, apart from housing, the object of these two exhibits was to demonstrate the fact that approximate breed weight can be attained with locally bred pure breeds, provided that they are well fed from the moment that they are hatched. A further object of the exhibits was to demonstrate simple principles of sound management, particularly in relation to the prevention of disease.

In the *attap* shed were some excellent pure-bred cockerels raised at the School. There was also a locally-made brooder and rearing outfit, and a small laying battery which is being tested at the School.

The interest aroused by the exhibit as a whole can be gauged from the fact that several visitors subsequently went to the School of Agriculture after the Exhibition to pursue their enquiries, and the number of tentative orders for stock and hatchings of eggs exceeded the potential output of the School for the remainder of this year and whole of 1937.

The Rubber Research Institute of Malaya.

The Chemical Division of the Rubber Research Institute of Malaya staged various exhibits. In the centre of the building were two scale models (scale 1:6) of the "Subur" type of smoke house, which for some time has been the standard recommendation of the Institute. In addition, a new experimental apparatus for concentrating latex was exhibited, and worked at intervals throughout the whole period of the Exhibition. A further exhibit demonstrated the dangers of copper contamination of latex and rubber, and shewed how this could be avoided. Many enquiries were received regarding these exhibits, and members of the staff were constantly in attendance to answer questions.

The Soils Division exhibited samples of the chief Malayan soil types, and the fertility attributes of these were illustrated by means of profile cards. The distribution of the various soil types was seen from the geological map. Graphs were on view giving the results of manuring and cultivation experiments on rubber on different soil types. Many enquiries were received, chiefly in connexion with manuring and replanting.

As part of its Small-Holders' Advisory Service the Institute erected two typical small-holders' smoke houses, such as can be made for a few dollars and will pay for themselves in about a month through the increased price obtained for the sheet smoked in them. These two smoke houses were working continuously, with Asiatic Rubber Instructors in attendance to explain their advantages. In addition, specimens of mangles suitable for small-holders were exhibited.

Medical Department.

The Public Health Exhibit was divided into two sections: (1) the Child Welfare Section, and (2) the Public Health Section. In the former, attention was drawn to the benefits of ante-natal care, the proper conduct of a normal labour and the rules of health in infancy and early childhood. For the Public Health Section a demonstration in the actual breeding of mosquitoes was given, in addition to showing modern methods in anti-malarial work. By means of numerous models the principles of modern sanitation were set forth, and attention drawn to the dangers of not carrying these out.

Other Government Departments.

The Posts and Telegraphs Department again provided telephone and postal facilities, and also staged a variety of interesting exhibits which continually attracted a large crowd of sightseers.

The Federated Malay States Railways displayed a 2nd class sleeping coach, advertising the facilities now available for travelling in comfort.

The Co-operative Societies Department, in addition to organizing the Village Industries Section, gave free cinema shows of propaganda films of agricultural interest.

Trade Section.

There was a disappointing decrease in stall-holders in this section, but stalls were, as usual, attractively designed and decorated. The models stall in this section was constantly surrounded by a large crowd, and the organizer is to be congratulated on the success of his obviously enthusiastic efforts.

General.

A rest-room for women was again provided by the Y.M.C.A. and was much appreciated.

A cycling carnival, badminton tournament and Malay "bangsawan" formed the amusement side of the Exhibition, and drew large crowds.

The Boy Scouts Association rendered extremely valuable services, and the police are to be congratulated on their excellent traffic control, which was assisted very considerably by the parking arrangements of the Automobile Association of Malaya.

Acknowledgment.

Acknowledgment is made of the assistance given by officers of the Department of Agriculture and of the Rubber Research Institute of Malaya in the compilation of this report.

Abstract.

TWENTY-SIXTH REPORT ON NATIVE RUBBER CULTIVATION IN THE NETHERLANDS INDIES.

*First Quarter 1936 with additional data up to the end of May.**

Prices.

As already stated in the preceding report, an export duty of 1 guilder-cent per ½ kilogram was imposed on rubber from January 1st 1936. The quarter opened with a quotation for Java standard sheet in Batavia of 19 guilder-cents or slightly more per kilogram, thus maintaining the price level of 20 guilder-cents obtaining at the end of December 1935. Subsequently prices improved, and at the end of the month 21 or 21½ guilder-cents was reached. After fluctuating from 22½ to 22¾ guilder-cents, the price towards the end of May was 23½ guilder-cents. Prices during the entire 1st quarter and the subsequent two months were considerably higher than in the 1st quarter of 1935. The firmness was attributed to the improving statistical position of the product and to increasing consumption. The half-monthly averages of the daily quotations for Java standard sheet in Batavia during the period under review—from January 1st to May 31st—were consecutively:—19.8, 21, 21.8, 22.5, 22.6, 22.9, 23.3, 23.5, 22.8 and 22.9 guilder-cents per ½ kg.

The increases and decreases effected in the extraordinary export duty on native rubber have lately been closely following the price trend.

The ratio between the prices of medium blanket and standard sheet in Singapore was further retained with slight fluctuations till the end of April. On the whole, medium blanket was quoted at about 1½ per cent. lower than standard sheet. In the early part of May this ratio became even more favourable, while from May 7th to May 14th the difference entirely disappeared and on one or two days the quotation for medium blanket was even ½ per cent. higher, afterwards becoming approximately 1 per cent. in favour of the standard sheet quotation.

Production and Exports.

The following table shews the monthly production and exports of native-grown rubber for the first five months of 1936.

The export figures for January and February include 24 and 5 tons respectively which must be placed to the account of 1935, since they belong to the rubber put under customs control on December 31, 1935, and furthermore they illustrate that, as a result of the maintenance of the domestic price at the desired level, the production of native rubber has not shewn great fluctuations. Seasonal activities in connexion with the cultivation of foodstuffs influence production as long as there is not too wide a fluctuation in domestic prices following manipulations of the extraordinary export duty.

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* Abstract from *The Netherlands Indies*, Vol. IV No. 12, June 16, 1936.

Table I.

Monthly Exports of Native Rubber.
(in Metric Tons, Dry Equivalent)

Month 1936	Exports	Movements of Stocks	Production
January	9,330	+ 2,096	11,426
February	16,397	− 3,511	12,886
March (provisional)	9,455	+ 2,183	11,638
April („)	12,556	− 1,114	11,442
May („)	10,797	+ 665	11,462

Table II.

Quarterly Exports of Native Grown Rubber.
(in Metric Tons, Dry Equivalent)

Quarter	Group Ia Blankets	Group Ib Sheets	Group IIa Scraps	Group IIb Slabs	Total	Percentage of total formed by Ia Ib.
1935						
1st quarter ...	8,299	7,924	953	18,863	36,039	45.2
2nd „ ...	13,851	15,508	1,009	20,646	51,014	57.7
3rd „ ...	10,230	9,514	19	8,097	27,860	70.9
4th „ ...	13,104	12,452	16	4,361	29,933	85.4
Total ...	45,484	45,398	1,997	51,967	143,846	62.7
1st quarter 1936						
Acheen ...	5	23	—	49	77	36.0
Sumatra's E. Coast ...	1,630	456	76	2,192	4,354	48.0
Tapanuli ...	343	885	—	—	1,228	100.0
Sumatra's W. Coast ...	369	9	—	10	388	97.0
Riouw ...	—	1,868	87	295	2,250	83.0
Banka ...	—	354	—	1	355	100.0
Djambi ...	1,386	3,582	—	148	5,116	97.0
Palembang ...	2,028	183	—	3,675	5,886	37.5
West Borneo ...	4,172	5,190	—	—	9,362	100.0
S. & E. Borneo ...	3,204	2,505	—	457	6,166	92.5
Total ...	13,137	15,055	163	6,827	35,182	80.0

Table III.

Quarterly Exports of Dry Native Grown Rubber to Consuming Territories.

(in Metric Tons, Dry Equivalent)

Quarter	Consuming Territories				Singapore and Penang	Total
	America	Europe	Japan	Total		
Blankets						
1935 1st quarter ...	4,208	886	411	5,505	2,794	8,299
2nd „ ...	7,986	851	185	9,022	4,823	13,845
3rd „ ...	6,270	744	146	7,160	3,006	10,166
4th „ ...	6,887	1,062	324	8,273	4,789	13,062
Total ...	25,351	3,543	1,066	29,960	15,412	45,372
1936 1st quarter ...	7,154	453	307	7,914	5,209	13,123
Sheets						
1935 1st quarter ...	432	168	455	1,055	6,917	7,972
2nd „ ...	1,217	278	473	1,968	13,539	15,507
3rd „ ...	1,533	513	167	2,213	7,326	9,539
4th „ ...	1,079	316	683	2,078	10,374	12,453
Total ...	4,261	1,275	1,778	7,314	38,156	45,470
1936 1st quarter ...	1,747	244	270	2,261	12,818	15,073

As already mentioned in the previous report the registration of native rubber plantations is being carried out with all possible energy.

The following data are being gathered for every plantation: (1) number of tappable trees tapped; (2) number of tappable trees not tapped; (3) number of non-tappable trees; (4) planting distances; (5) class (the tappable plantations are classified by the character and condition of the bark into four classes; in addition there is one separate class for neglected holdings); (6) type of soil.

Registration is proceeding satisfactorily and although a great deal of work is still required it may be anticipated that it will be possible to introduce individual restriction in all native rubber-growing districts from January 1st 1937.

Review.

The Termite, *Microtermes pallidus* Hav., in Relation to Tea in Malaya.

G. H. Corbett and N. C. E. Miller, Special Bulletin, Scientific Series No. 17, Department of Agriculture, Straits Settlements and Federated Malay States. Price 50 cents Straits Currency, post free.

Since the experimental cultivation of tea commenced at the Central Experiment Station, Serdang, in 1925, the crop has suffered no conspicuous damage, either from pests or diseases, with one notable exception, namely termites. During a period of four years, Messrs. G. H. Corbett and N. C. E. Miller have investigated the form of attack and possibilities of control of the termite, *Microtermes pallidus* Hav. and record, in the bulletin under review, the results and experience gained.

It is always an advantage when experimenting with new crops to select dissimilar conditions of land, since the manner in which the plants react in the divergent circumstances often affords a clue to successful treatment. In the case under notice it was found that tea bushes made relatively more vigorous growth on virgin land than on land previously cultivated. This experience is in general agreement with that obtained with numerous crops under local conditions. In addition, however, the bushes on the impoverished soil suffered considerable damage from attacks of termites, at all stages of growth. A series of experimental treatments in the affected areas was inaugurated by the Entomological Division of the Department of Agriculture. These are described in detail in the bulletin under reference. It was found that the use of chemical poisons and other substances had only a temporary deterrent effect, contrary to experience in Ceylon with other termite species. The only possible control measures that emerged during the investigations were the restoration of vigour in the tea bushes by means of manuring, and care in pruning and removal of all dead wood throughout the fields.

The most important conclusion arrived at is the establishment of the fact that, to-date, tea bushes planted at Serdang on virgin land have suffered no damage whatever from termite attack. Those who may plant tea in Malaya in the future would be well advised to follow the recommendations made, resulting from this timely investigation.

In addition to descriptions of certain stages in the development of *Microtermes pallidus* Hav. and *Termes javanicus* Holmg., a number of line drawings and halftone plates illustrate the text. The two termites described were found in association but the former only is responsible for direct damage to the tea bushes.

J. N. M.

RETIREMENT OF LT.-COL. B. J. EATON, O.B.E., F.I.C., F.C.S., F.I.R.I.

Lt.-Colonel B. J. Eaton, O.B.E., Agricultural Chemist, retired from Government Service on the 1st November 1935. He joined the service as Government Chemist on 12th May, 1906, and was appointed Agricultural Chemist on 27th August 1910. He acted as a Director of Agriculture from 24th May 1921 to 8th February 1922, and as Secretary for Agriculture from 9th February to 24th April 1926. On 1st November 1926 he was seconded to the Rubber Research Institute of Malaya as Head of the Chemical Division, and became acting Director of that Institution on 27th July 1929, being confirmed in the appointment on 1st November 1930.

The rubber industry owes much to the conspicuous research work which he carried out over a number of years, the results of which have been published in a number of books and contributions to the literature on this product.

As Director of the Rubber Research Institute he has shown that he is equally successful as an administrator as he is as a scientist, and the Institute owes much to his initiative and ability. It must not be forgotten that while with the Department of Agriculture, Lt.-Colonel Eaton carried out valuable investigations on a number of crops other than rubber, a record of which he leaves in the publications of the Department.

His long association with Malaya and his wide knowledge have always been readily given to the Department of Agriculture, and in this connexion the writer wishes to acknowledge the very valuable assistance he has given as a member of the Publicity Committee in the editing of this Journal.

Lt.-Colonel Eaton leaves Malaya with the good wishes of the officers in this Department, and we trust that his services to scientific agriculture may not be discontinued on account of his retirement.

D. H. G.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports by Agricultural Officers.

August, 1936.

The Weather.

Although the rainfall records received from certain areas show distinct variation from the majority, the greater number of the returns indicate that the low rainfall which characterized last month continued through August over most of the Peninsula, although more humid atmospheric conditions prevailed generally.

In Kedah and North Province Wellesley, dry conditions obtained during the first week, but thereafter wetter weather prevailed with periodic heavy showers and the rainfall recorded approximated to average. In South Province Wellesley and through practically the whole of Perak, the dry weather continued and precipitation was below the average for the month except on the coast of Lower Perak, where precipitation approximated to normal. This sparcity of rainfall was also common to the north coastal area of Selangor, North Pahang and Temerloh District, the east coast of Pahang and South Johore.

Much wetter weather than normal prevailed over the inland areas of Negri Sembilan and along the northern portion of the west coast of Johore and some flooding occurred in consequence. Precipitation approximated to normal in Malacca, Singapore and Kelantan.

Remarks on Crops.

Padi.—Planting was almost completed in North Kedah and made good progress in South Kedah under favourable weather conditions. In Province Wellesley, the conditions were not so favourable. Planting proceeded satisfactorily in the north but lack of water retarded operations in parts of Central and South Districts. The continued dry weather in Krian has retarded operations in most areas except Bagan Serai, and, consequently, prospects are not propitious. In the north-west, practically no planting was done at the end of the month and the difficulty in rotting down the cut vegetation through scarcity of water has led to the heaping of the partially rotted material in the fields, a practice that is inducive to rat damage to the crop on account of the harbourage these heaps afford the rodents. Similar retardation of operations through water shortage is reported from most other areas in Perak except the Bukit Gantang area in Larut and the Sungei Manik area, where the irrigation systems have maintained adequate water supplies, notwithstanding the continued dry weather. In Stage I, Sungei Manik, almost all the cultivators have adopted the *rakit* type of nursery followed by two transplantings, and the plants are making good growth. There has been some delay in clearing the land for planting, except in the oldest established portion of the

area where this work is nearing completion. In Stage II, secondary burning has proceeded satisfactorily except in the portion occupied by Kuala Kangsar Malays, where the first burn was poorly done. It is doubtful whether much of this latter portion will be planted in the coming season. In the remaining area where burning was satisfactory, padi has been dibbled instead of being sown in nurseries as advised. It would seem that the cultivators expect the conditions to be more favourable for dry padi than for wet, in spite of assurances having been given that water supplies would be adequate when needed. A good deal of maize has been dibbled in with the padi and it is expected that much of this is sufficiently far advanced to produce a crop before it is spoilt by flooded conditions. In Selangor, planting has been completed in the irrigated areas with the exception of Kuang and Beranang. At Kuang, a brushwood dam made by the cultivators lasted only a short time owing to faulty construction. At Beranang, water from the recently completed irrigation channels is available, but the cultivators are divided in opinion as to whether to plant this season or wait until January. They have been advised that it is preferable to plant a short season padi immediately rather than wait until January, as the prospects of obtaining a satisfactory crop from a January sowing are problematical. Of the non-irrigated areas, Bukit Cheraka is the worst situated, with nurseries already two months old and the fields quite dry. Nurseries were sown at Tanjong Karang in the first week of August and at Panchang Bedena a little later, but here also the fields are quite dry, with no prospect of suitable planting conditions obtaining until rainfall is sufficient to flood the land and fill the drains. In Negri Sembilan, the appearance of the crop is reported to be generally satisfactory, except in Kuala Pilah District where cultural operations have been very irregular. In Malacca, planting is nearing completion under generally favourable conditions. There has been a marked increase in the use of rock phosphate as a manure this season. In Pahang, transplanting was completed in the down-river mukims of Lipis District and is in progress in the up-river mukims. In Raub District planting has commenced, but some nurseries were destroyed by drought, especially in the mukim of Semantan Ulu. In Temerloh District it is reported that an increased area is being planted as compared with last year and the growth of the crop is satisfactory in Bentong District. Reports from East Pahang record an increased area planted in Pahang Tua mukim and some water shortage in Kuala Kuantan. In Kelantan, much of the dry padi land still remains unplanted and cultivation for long term wet padi in Pasir Puteh District is backward.

Rubber.—Prices for smoked and unsmoked sheet covered by coupons remained substantially the same as last month in most centres but eased slightly in some.

The Province Wellesley Circle report records that much uncouponed rubber is being taken from south of the Province for sale in Penang. In South Province Wellesley respective prices for uncouponed rubber are as high as $14 per picul with coupons changing hands at $21 per picul equivalent. Coupons are, however, plentiful in Penang and change hands at a low figure; hence there is a strong demand for uncouponed rubber to cover the excess coupons.

During the month a further 10 smoke cabinets were constructed, 1 in Kedah, 5 in Perak (with 5 others under construction in Batang Padang District) and 4 in Johore.

Reports show that great differences existed in different parts of the country in the price offered for small-holders' smoked sheet as compared with unsmoked. Thus in South Province Wellesley, there was a difference of only 35 cents per picul between the lowest grade F.A.Q. and standard smoked sheet. Under these circumstances it is more economical for small-holders to sell unsmoked sheet. In Penang there is by comparison a greater difference between unsmoked and smoked sheet, through lower quotations being offered for the former. It is similarly reported from Negri Sembilan that the smoke cabinets erected in Kuala Pilah District were not in use owing to the small difference in price quotations between smoked and unsmoked sheet. On the other hand, an owner of a smoke cabinet at Pondok Tanjong in Perak is obtaining better prices than heretofore for his smoked sheet by from $1.20 to $1.50 per picul, marketing direct in Taiping. It is reported from Pahang North that prices for smoked sheet have risen slightly whilst quotations for unsmoked have decreased.

Coconuts.—Copra prices have shown distinct improvement during the month. The Penang quotation for sundried touched $5.90 per picul on several days towards the end of the month with an average for the month of about $5.65 per picul.

The demand for fresh nuts in Province Wellesley for export was so brisk that copra making by small-holders remained uneconomic. The price offered for fresh nuts was $25 per 1,000 in accessible places and correspondingly lower where transport is difficult. The buyers of fresh nuts have extended their field of activities very considerably during recent months. In the Bagan Datoh District of Perak a further twin-smoking cabinet is nearing completion. This makes the third for the area, all three being erected in out-of-the-way kampongs. The kiln at Beserah in Pahang, owned by a Malay small-holder, continued to function throughout the month and his produce was disposed of at satisfactory prices. In Johore, four further cabinet-type kilns were erected in the Batu Pahat District and two in the mukim of Sungei Balang, Muar District. Chinese copra dealers in this State are showing considerable interest in the cabinet type of kiln. A Chinese kongsi at Benut in Batu Pahat District, that claims to handle 300,000 nuts a month, has erected several cabinet kilns of a larger size than has hitherto been tried. Experiments with a large size cabinet kiln at Klang Coconut Station show that kilns so large as these require very special attention to the method of firing, and no fully satisfactory method has yet been found although further experiments are proceeding; the venture by the Chinese will, therefore, be watched with particular interest. The Agricultural Officer, Johore Central, visited the islands of Babi, Aur, Pemanggil and Tinggi, situated off the east coast of Johore, and erected a cabinet kiln on each with the object of effecting improvement in the methods of copra production which are at present somewhat primitive.

Agricultural Stations and Padi Test Plots.

Agricultural Stations.—Plots of one relong (.71 acre) were planted with pulasan and pineapples respectively at Gaja Mati Station in Kedah. In the Province Wellesley Circle, a plot of pepper was planted at Bukit Mertajam Station and, at Ayer Itam Station, sweet potatoes were planted and holing continued for arecanuts, whilst the planting of carpet grass on the main paths was in progress. At Selama Station in the Krian Circle of Perak, Stage III of the standard manurial experiment for annual dry crops was harvested, the crop being tapioca. At Tanah Rata, Cameron Highlands, further sowings were made of seed of *Aleurites montana*, collected on the Station, and seeds of *Cinchona succirubra* were sown in nursery beds. In Selangor, seeds of rambutan, durian and pulasan were sown in nursery beds at both Cheras and Telok Datoh Stations to provide material for budding. It has been decided to close down both the Chinese vegetable garden and the piggery at Cheras Station as it is considered both these ventures have served the purpose for which they were established. The future main functions of the Station will be fruit and poultry raising for distribution and demonstration. At Tangkak Station in Johore North, a plot of the Changi variety of tuba root was planted, the poultry runs marked off and a number of various seeds sown in the nurseries.

Padi Stations and Test Plots.—In Kedah, planting was completed or in progress on all Stations and Plots under satisfactory conditions except at Langkawi and Pulai Test Plots, where nurseries were sown early in the month. In Province Wellesley, planting was commenced at Bukit Merah Station under satisfactory conditions. The growth of seedlings in the nurseries was not very satisfactory. The clearing of the Sungei Acheh Test Plot was completed, but scarcity of water is retarding the rotting of the cut vegetation. In Krian, planting on Titi Serong Station is later than usual, having commenced only at the end of the month. Similar delay in operations owing to scarcity of water was experienced at most Test Plots in Krian except Bagan Serai and Sungei Kepar, where seedlings have made good growth and water has been sufficiently plentiful to allow operations to be performed to schedule time. At Talang Station the seedlings made good growth in the usual dry nurseries but planting was commenced under somewhat unfavourable conditions due to difficulties with the dam which has been a source of trouble in previous years. At Sungei Manik Station, seedlings have made good growth, except on a hard portion of the area which was the site of a former path, and irrigation conditions are good so that it is expected that planting should proceed satisfactorily, both on the half planted by daily paid labour and on the other portion planted by tenants. In Selangor, flowering has commenced on Kajang Test Plot and ploughing was completed at Kuang. Nurseries were sown at the Tanjong Karang and Panchang Bedena Test Plots. The seedlings have made satisfactory growth, but prospects for planting are not favourable unless copious rain soon falls, as the land is still dry and the water table low. In Negri Sembilan, seasonal operations were carried out on all Test Plots under satisfactory conditions and the planted padi has made good growth generally. It is recorded that at Kendong Test Plot marked increased growth is

shown on the areas treated last season with heavy dressings of rock phosphate and superphosphate, as compared with other areas not so treated. In Malacca the planting of all experiments was completed at Pulau Gadong except for the short term Radin Siak variety. On the mechanical cultivation area, notwithstanding the difficulties experienced through excess water during drilling operations, the growth of the plants is good except for low areas where germination was poor. Weed growth is, however, heavy in patches, but it is expected that irrigation, which is to commence shortly, will ameliorate the latter trouble. In Pahang, some scarcity of water was experienced at the Lipis and Dong Test Plots, but the growth of the plants is satisfactory. At Sungei Blat Test Plot seedlings have made good growth in the nurseries, but some water shortage is feared when planting is due to commence. In Kelantan, planting was begun at Pasir Puteh. At the Central Station, the planting of dry padi was completed and nurseries of wet padi were sown. At Bachok, the fourth harrowing and ploughing was completed on the 5th of the month and planting was done on the following day. Growth of the plants is only moderate. Planting of the wet padi was begun at Bachok.

DEPARTMENTAL NOTES.

Visits of the Adviser on Agriculture.

The Hon'ble the Acting Adviser on Agriculture, Malay States, visited Teluk Anson on the 28th and 29th August, and read a paper on the Competitors and Economic Prospects of the Coconut Industry to the Teluk Anson Branch of the Incorporated Society of Planters. He also took the opportunity of visiting the new Sungei Manik Padi Area.

The Acting Adviser inspected the Government Dairy Farm, Fraser's Hill on 15th August.

Tour of the Rural Lecture Caravan.

The Rural Lecture Caravan was on tour in Pahang from August 8th to August 27th. Twenty centres were visited, two days being spent in each locality. The tour commenced at Jerantut and ended at Benus (Bentong); it was conducted almost entirely by river, the projectors and exhibits being carried by house boat.

Leave.

Mr. R. B. Jagoe, Assistant Botanist, has been granted an extension of leave on half pay for one month from 18th September for the purpose of study of cytological technique and cytogenetical problems. Mr. Jagoe is working on these problems at the John Innes Horticultural Institute, Menton, Surrey.

Mr. J. A. Baker, Agricultural Officer, returned from leave on the 2nd September, and assumed temporary duty at Headquarters as assistant to the Chief Field Officer on the 3rd September.

Statistical.

MARKET PRICES.

August, 1936.

Major Crops.

Rubber.—The market remained steady throughout the month at the lower level recorded at the close of July, with slight further weakening. Spot loose opened in Singapore at 26⅞ cents per lb. and closed at 26½ cents per lb. The average price for the month of No. 1 X. Rubber Smoked Sheet was 26.59 cents per lb. as compared with $26.92 cents in July. The London average price was 7.58 pence per lb., and the New York price 16.17 cents gold, as compared with 7.70 pence, and 16.4 cents gold in the previous month.

Prices paid for small-holders' rubber at three centres during August are shewn in the following table.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, August, 1936.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	6	13	20	27	5	12	19	26	5	12	19	26
Smoked sheet	34.00	33.70		33.60	34.25	34.00	33.50	33.53		33.50	33.40	
Unsmoked sheet	32.50		33.00	32.00		32.00	31.10		32.50	32.10	32.00	32.20
Scrap			27.00									

Transport by F. M. S. R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent

Palm Oil.—The market continued its upward trend and the month's prices are given in Table II.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1936.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
August 7	19. 7. 6	10. 12. 6
„ 14	20. 0. 0	10. 12. 6
„ 21	20. 0. 0	10. 17. 6
„ 28	20. 10. 0	10. 15. 0

Copra.—Prices again continued on the upward grade with slight occasional weakening. The sun-dried grade opened in Singapore at $5.15 per picul and closed at $5.55, averaging $5.40 per picul for the month as compared with $5.25 in July. The mixed quality averaged $4.85 as against $4.82 per picul in the previous month.

Copra cake improved to $2 per picul, averaging $1.95 for the month, as compared with $1.62 in July.

Rice.—The average wholesale prices of rice per picul in Singapore in July were as follows:—Siam No. 2 (ordinary) $3.62, Rangoon No. 1 $3.45, Saigon No. 1 $3.50, as compared with $3.75, $3.50 and $3.50 respectively in June. The corresponding prices in July 1935 were: $4.22, $3.85 and $3.87.

The average retail market prices in cents per gantang of No. 2 Siam rice in July were: Singapore 28, Penang 30, Malacca 26, or unchanged as compared with June.

The average declared trade value of imports of rice in July was $3.57 per picul, as compared with $3.64 in June and $3.60 in May.

Padi.—The nominal price of padi at the Government Rice Mill, Bagan Serai, was $1.90 per picul. Retail prices of padi ranged from 6 to 13 cents per gantang.

Pineapples.—Prices per case remained unchanged throughout the month at: Cubes $3.40, Sliced Flat $3.10, Sliced Tall $3.40.

Prices of fresh fruit per 100 were: Johore 1st quality $2.70 to 4.50, 2nd quality $1 to $3.80, 3rd quality 80 cents to $2; Singapore $3 to $3.70; Selangor $1.20 to $1.80.

Beverages.

Tea.—Nine consignments of Malayan tea were sold on the London market during August; three consignments were of upland tea and were sold at 1s. 0d. and 1s. 0¼d. per lb., and the lowland tea ranged from 11½d. to 1s. 0d. per lb.

Average London prices per lb. during August for consignments of tea from other countries were as follows:—Ceylon 1s. 1.03d., Java 10.48d., Indian Northern 1s. 1.69d., Indian Southern 11.92d., Sumatra 9.85d.

The latest Colombo average prices available are quoted from the *Weekly Tea Market Report,* 25th August, 1936, of the Colombo Brokers' Association, and are as follows, in rupee cents per lb:— High Grown Teas 78 cents, Medium Grown Teas 66 cents, Low Grown Teas 61 cents.

Coffee.—Sourabaya coffee weakened slightly in Singapore during August, averaging $12.94 to $13.94 per picul as against $13.16 to $14.35 per picul in July. Palembang coffee averaged $6.88 to $7.81 per picul as compared with $6.80 to $7.70 in July.

Spices.

Arecanuts.—The following are the averages of the range of prices per picul in Singapore during August: Splits $4.81 to $6.38; Red Whole $4.31 to $5.88; Sliced $8.75 to $10.38.

The Singapore Chamber of Commerce prices improved still further, average prices per picul being: Best $7, Medium $6.40, Mixed $5.75.

Pepper.—Nominal quotations in Singapore were again lower, averages for the month being: Singapore Black $7.40, Singapore White $13.70, Muntok White $14.05 per picul.

Nutmegs.—Prices in Singapore improved during August, averages being: 110's $29.40, 80's $29.60 per picul, as compared with $28 and $29 respectively in July.

Mace.—Siouw rose to $95, and Amboina to $80 per picul, average prices for the month being $90 and $75 per picul respectively, as compared with $85 and $70 in July.

Cloves.—Nominal quotations for both Zanzibar and Amboina remained unchanged at $37 per picul.

Cardamoms.—Green cardamoms were quoted during August in the Ceylon Chamber of Commerce reports from Rs. 1.65 to Rs. 1.82 per lb.

Miscellaneous.

Derris (Tuba Root).—The Singapore market remained dull throughout August in the marked absence of demand. Average prices were unchanged as compared with the previous month, being $48 per picul for roots sold on rotenone content, and $33 per picul for roots sold on the basis of ether extract.

Gambier.—The Singapore market improved slightly at the close of the month, average prices per picul being: Block $4.80, No. 1 Cube $9.80, as compared with $4.77 and $9.88 respectively in July.

Tapioca.—Prices in Singapore continued unchanged at: Flake, Fair $5.50, Seed Pearl $5.50, Medium Pearl $6.50 per picul.

Sago.—There was a further marked improvement in the Singapore market during August, average prices per picul being: Pearl, Small Fair $4.18, Flour, Sarawak Fair $2.69, as compared with $3.92 and $2.44 respectively in July.

Tobacco.—Prices of prepared leaf in Selangor ranged from $75 to $100 per picul, and in Kelantan were $100, $81 and $64 per picul for 1st, 2nd and 3rd qualities respectively.

The range of prices elsewhere was: 1st quality $20 to $40, 2nd quality $15 to $32, 3rd quality $10 to $21 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross. London, S.W.1.

GENERAL RICE SUMMARY*

July, 1936.

Malaya.—Imports of foreign rice during July were 62,886 tons, and exports 17,169 tons. Net imports for the seven months were 306,089 tons as compared with 263,697 tons in 1935.†

Of the imports during July, 45 per cent. were consigned to Singapore, 20 per cent. to Penang, 5 per cent. to Malacca, 23 per cent. to the Federated Malay States, and 7 per cent. to the Unfederated Malay States. The imports by countries of origin were as follows:—Siam 66.5 per cent., Burma 30.7 per cent., French Indo-China 1.6 per cent., and other countries 1.2 per cent.

Of the July exports, 73 per cent. were consigned to the Netherlands Indies and 27 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets): Siam 13,127 (76.5), Burma 3,184 (18.6), French Indo-China 712 (4.1), parboiled 143 (0.8), local production 3 (0.0).

India and Burma.—Foreign exports of rice for the first half of 1936 totalled 766,000 tons as compared with 1,134,000 tons in 1935, a decrease of 32.5 per cent. Of these exports 4.2 per cent. were to the United Kingdom, 20 per cent. to the Continent of Europe, 26.9 per cent. to Ceylon, 19 per cent. to the Straits Settlements and the Far East, and 29.9 per cent. to other countries. The corresponding percentages in 1935 were 4.8, 12.1, 19.9, 32.5 and 30.7.

Siam.—Exports of rice and rice products from Bangkok during May were 143,885 tons; the cumulative total for the five months was 692,017 tons as compared with 701,494 tons in 1935.

Japan.—The latest information available was published in the June Summary.

French Indo-China.—Entries of padi into Cholon during the first seven months of 1935 totalled 1,026,975 metric tons as compared with 1,223,082 metric tons in 1935, a decrease of 16 per cent. Exports of rice during the same period decreased by 14.6 per cent. from 1,270,418 metric tons in 1935 to 1,085,387 metric tons in 1936.

The Netherlands Indies.—According to the *Netherlands Indies Economic Bulletin,* 1st June, 1936, the 1935 padi crop was on an average considerably better than in 1934. The total yield of "wet padi" in Java was estimated at 7 million tons in comparison with 6.4 million tons in 1934.

Ceylon.—Imports during the first seven months of 1936 totalled 312,628 tons, as compared with 299,485 tons in 1935, an increase of 4.4 per cent. Of these imports 13 per cent. were from British India, 62.2 per cent. from Burma, 0.2 per cent. from the Straits Settlements and 24.6 per cent. from other countries.

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* Abridged from the Rice Summary for July, 1936, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1935.

Europe and America.—Shipments to Europe from the East during the period 1st January to 9th July were 753,857 tons, as compared with 473,416 tons in 1935, an increase of 59.2 per cent. Of the 1936 shipments 32.6 per cent. were from Burma, nil from Japan, 59 per cent. from Saigon, 7.2 per cent. from Siam, and 1.2 per cent. from Bengal. The 1935 percentages were 63.5, 5.0, 24.7, 4.6 and 2.2.

Shipments for the Levant from the 1st January to 9th July, 1936, totalled 8,252 tons as compared with 22,224 tons in 1935, a decrease of 62.9 per cent. Shipments for Cuba, West Indies and America from 1st January to 2nd July aggregated 151,752 tons, as compared with 128,263 tons in 1936, an increase of 18.3 per cent.

MALAYAN AGRICULTURAL EXPORTS, JUNE AND JULY, 1936.

PRODUCT.	Net Exports in Tons						
	Year 1935	Jan.-July 1935	Jan.-July 1936	June 1935	June 1936	July 1935	July 1936
Arecanuts ...	21,885	14,644	17,334	2,257	2,726	2,277	2,380
Coconuts, fresh †	106,272†	62,152†	70,135†	9,537†	11,952†	13,522†	13,569†
Coconut oil ...	35,911	17,980	26,530	2,304	4,186	3,172	3,797
Copra ...	111,752	61,552	32,327	8,669	5,243	10,069	536
Gambier, all kinds	2,837	1,605	1,288	167	198	299	193
Oil cakes ...	11,361	4,423	9,209	347	1,824	830	2,059
Palm kernels ...	3,892	1,882	2,365	221	325	280	378
Palm oil ...	24,996	12,076	13,416	913	2,861	2,486	1,891
Pineapples canned	73,923	46,039	54,894	9,805	14,037	6,950	8,689
Rubber ¶ ...	378,381¶	230,917¶	185,952	28,307¶	29,457¶	37,972¶	33,119¶
Sago,—flour ...	10,920	5,319	3,485	577	635*	36*	1,038
,, —pearl ...	4,655	2,662	1,874	459	266	366	240
,, —raw ...	7,735*	4,176*	4,127*	849*	341*	561*	196*
Tapioca,—flake ...	1,953	1,136	1,002	133	74	155	108
,, —flour ...	755*	614*	1,169*	37*	149*	116*	187*
,, —pearl ...	17,169	9,785	9,330	1,366	1,844	1,866	1,402
Tuba root ...	567	361	405	56	50	48	47

† hundreds in number. * net imports. ¶ production.

MALAYAN PRODUCTION (IN TONS) OF PALM OIL AND KERNELS

(As declared by Estates)

Month 1936	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S
January ...	1,395.4	326.5	258.6	37.2
February ...	1,531.9	372.4	244.2	54.6
March ...	1,878.4	534.5	302.9	88.0
April ...	1,410.6	446.8	250.0	80.0
May ...	1,346.1	644.8	238.1	114.6
June ...	1,557.4	658.3	245.5	100.9
July ...	2,270.5	975.7	349.1	147.6
Total ...	11,390.3	3,959.0	1,888.4	622.9
Total January to July, 1935 ...	8,441.5	3,137.3	1,274.3	454.7
Total for year 1935 ...	**17,338.7**	**5,764.6**	**2,711.1**	**818.4**

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST JULY, 1936.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1935	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (*a*)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,526	400	0.9	16,449	36.9	503	1.1	16,849	37.8
Malacca	121,601	4,260	3.5	31,019	25.5	2,834	2.3	35,279	29.0
Penang Island	2,575	675	26.2	569	22.1	283	11.0	1,244	48.3
Singapore Island	34,525	3,607	10.4	9,725	28.2	394	1.1	13,332	38.6
Total S.S. ...	203,227	8,942	4.4	57,762	28.4	4,014	2.0	66,704	32.8
FEDERATED MALAY STATES :—									
Perak	294,988	12,139	4.1	70,145	23.8	14,527	4.9	82,284	27.9
Selangor	332,165	12,481	3.8	68,591	20.6	15,849	4.8	81,072	24.4
Negri Sembilan	258,304	13,077	5.1	52,992	20.5	16,601	6.4	66,069	25.6
Pahang	77,210	9,711	12.6	26,643	34.5	16,952	22.0	36,354	47.1
Total F.M.S. ...	962,667	47,408	4.9	218,371	22.7	63,929	6.6	265,779	27.6
UNFEDERATED MALAY STATES :—									
Johore	432,443	31,141	7.2	67,811	15.7	39,310	9.1	98,952	22.9
Kedah	199,607	16,426	8.2	25,505	12.8	15,382	7.7	41,931	21.0
Kelantan	30,474	403	1.3	10,365	34.0	5,093	16.7	10,768	35.3
Trengganu (*b*)	4,643	Nil	Nil	Nil	Nil	138	3.0	Nil	Nil
Perlis (*c*)	1,575	Nil	Nil	689	43.7	64	4.1	689	43.7
Brunei	6,010	Nil	Nil	1,712	28.5	913	15.2	1,712	28.5
Total U.M.S. ...	674,752	47,970	7.1	106,082	15.7	60,900	9.0	154,052	22.8
TOTAL MALAYA ...	1,840,646	104,320	5.6	382,215	20.8	128,843	7.0	486,535	26.4

Notes :—(*a*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*b*) Registered Companies only.
(*c*) Rendered quarterly.

MALAYAN RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF JULY, 1936, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		January to July 1936		during the month		January to July 1936						
	Ports	Dealers	Estates of 100 acres and over	during the month	January to July 1936	during the month	January to July 1936	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	January to July 1936
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	5,708	11,936	10,894	68,739	8,596	36,500	Nil	Nil	Nil	Nil	13,772	4,359	79,033	25,680	...	7,701	11,289	13	60
Johore ...	..	2,238	4,264	4,385	28,169	3,591	20,800	Nil	111	Nil	525	2,274	5,486	15,338	33,181	...	2,594	4,235	...	...
Kedah ...	...	238	2,858	2,620	17,541	1,170	4,985	Nil	Nil	Nil	Nil	1,547	2,344	9,686	13,410	...	377	2,618	...	...
Perlis ...	...	4	20	10	74	30	140	Nil	Nil	Nil	Nil	Nil	33	Nil	207	...	13	18	...	...
Kelantan ...	...	240	273	320	1,958	1,071	4,055	Nil	Nil	Nil	Nil	142	1,126	959	4,969	...	307	329	...	...
Trengganu ...	...	55	50	195	1,515	97	758	Nil	Nil	Nil	Nil	Nil	292	Nil	2,273	...	55	50	...	...
Brunei ...	..	3	49	47	294	93	424	...	...	...	...	...	138	...	717	...	19	35	...	...
Total Malay States	...	8,486	19,450	18,471	118,290	14,648	67,662	Nil	111	Nil	525	17,735	13,778	105,016	80,437	...	11,066	18,574	13	60
S. SETTLEMENTS :—																				
Malacca ...	...	2,850	1,206	1,029	6,923	445	3,792	Nil		Nil		3,738		16,734		...	1,920	1,188	...	...
Province Wellesley	...	1,423	566	444	2,779	187	1,460	Nil		Nil		9,259		50,600		...	952	509	...	...
Penang ...	2,041	5,188	10	14	114	27	564	3,084	12,981	18,153	78,166		Nil		Nil	1,330	5,021	9	...	...
Singapore ...	2,795	18,236	160	139	1,010	43	804	15,906		86,127		22,382		127,721		5,603	17,489	161	29	163
Labuan ...	...	15	Nil	Nil	Nil	14	112	48		478		Nil		Nil		...	16	Nil	...	...
Total Straits Settlements ...	4,836	27,712	1,942	1,626	10,826	716	6,732	19,038	12,981	104,758	78,166	35,379	Nil	195,055	Nil	6,933	25,398	1,867	29	163
Total Malaya ...	4,836	36,198	21,392	20,097	129,116	15,364	74,394	19,038	13,092	104,758	78,691	53,114	13,778	300,071	89,437	6,933	36,464	20,441	42	223

*Amended

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	6,438	16,525	4,710	2,481	2,282	184
WET RUBBER	1,263	964	311	426	312	193
TOTAL ...	7,701	17,489	5,021	2,907	2,594	377

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to July 1936
29	30	31
Singapore ...	33,039	190,142
Penang ...	13,000	37,088
Port Swettenham.	5,766	34,142
Malacca ...	1,309	2,699
MALAYA ...	53,114	300,071

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to July 1936
32	33	34
Malay States ...	31,513	185,453
Straits Settlements	2,529	16,642
MALAYA ...	34,042	202,095

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Column (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication, therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 22nd August, 1936.

METEOROLOGICAL SUMMARY, MALAYA, JULY, 1936.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B.	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	90.8	71.7	81.3	98	68	83	75	84.0	84.8	1.41	35.8	0.67	6	6			1	196.45	6.34	51
Bukit Jeram, Selangor ...	88.3	72.7	80.5	91	67	80	75	83.8	86.3	2.25	57.2	0.55	9	8	1		3	231.70	7.47	61
Sitiawan, Perak ...	89.2	72.6	80.9	92	69	85	76	84.1	84.7	6.13	155.7	1.02	16	13	3			213.75	6.89	56
Temerloh, Pahang ...	88.8	72.0	80.4	93	70	81	74	85.2	85.8	0.88	22.3	0.37	7	4	1	9		186.70	6.02	49
Kuala Lipis, Pahang ...	89.3	71.7	80.5	93	67	81	75	84.4	84.9	1.25	31.8	0.42	9	6	2	17	2	186.20	6.01	49
Kuala Pahang, Pahang ...	86.8	74.2	80.5	91	69	81	78	85.5	86.2	5.06	128.5	1.70	9	6	1			209.10	6.75	55
Kallang Aerodrome, S'pore ...	86.1	77.7	81.9	89	71	82	82	82.5	83.8	4.88	124.0	1.56	12	9	3		1	210.90	6.80	56
Butterworth, Province Wellesley ...	87.9	73.9	80.9	91	69	81	76	84.8	86.0	6.27	159.3	1.66	10	8	1		2	212.05	6.84	56
Bayan Lepas Aerodrome Penang ...	87.2	73.8	80.5	90	70	80	77	84.2	84.7	9.81	249.2	3.93	13	12	2		2	200.80	6.48	53
Bukit China, Malacca ...	85.1	73.7	79.4	87	70	81	78	83.0	84.1	10.34	262.6	2.30	20	17	3		5	200.05	6.45	53
Kluang, Johore ...	87.6	70.9	79.3	93	67	76	75	81.8	82.5	4.32	109.7	0.91	15	14	3	10	1	197.70	6.38	52
Bukit Lalang, Mersing, Johore	86.8	71.9	79.3	91	69	77	74	81.9	82.0	9.44	239.8	2.80	17	14	6	2	3	217.05	7.00	57
Alor Star, Kedah ...	87.7	74.3	81.0	91	71	80	77	85.9	86.2	12.50	317.5	2.59	22	20	3			191.65	6.18	50
Kota Bahru, Kelantan ...	89.9	73.5	81.7	93	70	85	76	83.7	84.6	8.94	227.1	4.26	13	10	4		2	194.35	6.27	51
Kuala Trengganu, Trengganu	87.9	72.9	80.4	90	69	85	76	83.3	84.4	2.91	73.9	1.04	12	9	4	1	1	212.90	6.87	55
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	75.2	62.6	68.9	79	59	68	65	71.8	72.5	0.68	17.3	0.23	10	8		6	1	201.95	6.51	53
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	72.8	55.8	64.3	76	49	66	63	69.8	69.9	2.88	73.2	0.72	13	10		2	2	168.60	5.44	44
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	71.8	59.3	65.5	76	56	67	61			2.64	67.1	0.52	14	10		2	2	182.00	5.87	47

Compiled from Returns supplied by the Meteorological Branch, Malaya